

*R. C. Allen*

# The American Midland Naturalist

Devoted to Natural History

Primarily that of the Prairie States

Founded by J. A. Nieuwland, C.S.C.

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Theodor Just, Botany

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Edited by Theodor Just

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## Bibliography of Biographies of Entomologists\*

Mathilde M. Carpenter

For more than fifteen years the excellent "Bibliography of Entomologists" prepared by Mr. J. S. Wade, *Ann. Ent. Soc. Amer.*, 21:489-520, 1928, has proved of great value to all who have an interest in the development of the science. The time seems ripe for what might be called a second edition of the work, one which will bring the subject up to date and which at the same time will enlarge its scope to include the records of biographical matter for all entomologists of all countries. It is intended that the list will be complete through 1943.

The work was undertaken because of frequent inquiries about more or less inaccessible biographical data, and has been carried out in spare time for several years. All the leading entomological periodicals and many other sources have been consulted. The references include not only obituaries, but birthdays, portraits, anniversaries, biographies and disposition of collections. As regards the last named item, the writer regrets that the italicized C could not have been placed before a reference to indicate the disposal and present location of a collection, but the realization of its importance came too late to be utilized. However, such information of all important insect collections up to 1937 can be found in an extensive paper by Walther Horn and Ilse Kahle in *Entomologische Beihefte aus Berlin-Dahlem*, 2:1-160, 1935; 3:161-296, 1936; 4:297-388, 1937.

Mistakes and omissions undoubtedly occur. In spite of these, the writer hopes that the work as a whole will be useful and she will welcome corrections of these errors.

### Bibliography of Biographies of Entomologists

Italicized letters A=Anonymous, B=Biography, P=Portrait.

- ABBOTT, John. (1750-1840). Dow, R. P., *Journ. N. Y. Ent. Soc.*, 22: 65-72, 1914; Faxen, W., *Auk*, 13: 204-215, 1896; Goode, G. B., *Ann. Rpt. Smithsn. Inst.* 1897, 2 (2): 429, 1901; Jardine, W., *Naturalist's Library*, 32: 69-71, 1858; Scudder, S. H., *Can. Ent.*, 20: 150-154, 1888; Kirby, W. F., *Can. Ent.*, 20: 230-232, 1888; Morris, J. G., *Amer. Journ. Sci. & Arts*, 1: 19-20, 1846; Rhoads, S. N., *Auk*, 35: 271-286, 1918; Scudder, S. H., *Ann. Rpt. Ent. Soc. Ont.*, 19: 48-50, 1888; Smith, J. B., *P., Pop. Sci. Mo.*, 76: 469-470, 1910; Stone, W., *Auk*, 23: 361-368, 1906; Swainson, W., *B., Bib. of Zool.*, pp. 99-100, 1840; Walton, W. R., *Proc. Ent. Soc. Wash.*, 23: 78-81, 1921; Hagen, H., *Stett. Ent. Zeit.*, 24:

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- 369-378, 1863; Scudder, S. H., *P.*, Butterflies eastern U. S. and Canada, 1: 651-654, 1889; Osborn, H., *P.*, Fragments Ent. Hist., pp. 11, 310, 1937.
- ABBOTT, Walter Sidney. (1879-1942). *A.*, Journ. Econ. Ent., 35: 953, 1942; Siegler, E. H., et al., Proc. Ent. Soc. Wash., 45: 92, 1943.
- ABEILLE DE PERRIN, Elzéar. (1843-1910). Semenov-Tian-Shanskij, A., Rev. Russe Ent., 12: 635-636, 1912; Caillol, H., Ann. Soc. Ent. France, 80: 492-502, 1911.
- ACHARD, Julien. (1881-1925). Rambousek, F., *P.*, Acta Soc. Ent. Cechosl., 23: 1-3, 1926; Peschet, R., Bull. Soc. Ent. France, p. 325, 1925.
- ACHARIUS, Erik. (1757-1819). *A.*, *B.*, Kongl. Vetensk. Acad. Handl. (Svensk.), 40: 299-305, 1819; *A.*, Meisner's Naturw. Anzeiger, 3: 65-66, 1820; Nordenskiöld, Erik, Hist. of Biol., p. 440, 1935.
- ACKERMAN, Arthur John. (1889-1937). Porter, B. A., Journ. Econ. Ent., 30: 385-386, 1937.
- ADAMS, Frederick Charlstrom. ( -1920). *A.*, Ent. News, 32: 64, 1921; Austen, E. E., Ent. Mo. Mag., 56: 256, 1920.
- ADAMSON, Michel. (1727-1806). Fée, A. L. A., Mem. Soc. Sci. Lille, 1: 155-158, 1831 (1832).
- ADKIN, Robert. (1849-1935). Sheldon, W. G., *P.*, Entomologist, 68: 145-147, 1935; Turner, H. J., Ent. Record, 47: 95-96, 1935; *A.*, Ent. Mo. Mag., 71: 187, 1935.
- ADLERZ, Gottfried Agaton. (1858-1918). Aurivillius, C., *B.*, *P.*, Ent. Tidskrift., 40: 65-71, 1919.
- AGASSIZ, Alexandre. (1835-1910). Perrier, E., Bull. Mus. Hist. Nat. Paris, 16: 117-118, 1910.
- AGASSIZ, Jean Louis Rodolphe. (1807-1873). Bouvé, T. T., et al., Proc. Bost. Soc. N. H., 16: 210-237, 1874; Silliman, B., Amer. Journ. Sci. & Arts, (3) 7: 77-80, 446-448, 1874; Wilder, B. G., Pop. Sci. Mo., 71: 1-20, 1907; Wilder, B. G., Harvard Grad. Mag., June: 603-606, 1907; Wilder, B. G., Cornell Era, 39: 441-448, 1907; *A.*, Leopoldina, 10: 66-69, 1874; *A.*, Gaea, 10: 105-110, 1874; *A.*, Amer. Nat., 8: 62-63, 1874; Bliss, R., *P.*, Pop. Sci. Mo., 4: 608-618, 1874; *A.*, Cincinn. Quart. Journ. Sci., 1: 86-88, 1874; Nordenskiöld, Erik, Hist. of Biol., pp. 479-481, 1935; *A.*, Proc. Roy. Soc. Lond., 25: xxii-xxx, 1876-77; Osborn, H., *P.*, Fragments Ent. Hist., 1937; Youmans, W. J., *P.*, Pioneers of science in America, pp. 475-491, 1896.
- AHRENS, August. (1779-1841). Germar, E. F., Stett. Ent. Zeit., 3: 45-48, 1842.
- AIGNER-ABAFI, Ludwig von. (1840-1909). Csiki, E., *P.*, Rovart. Lapok (Hung.), 17: 34-37, 1910.
- AINSLIE, Charles Nicholas. (1856-1939). Mickel, C. E., Ann. Ent. Soc. Amer., 33: 215-216, 1940; Packard, C. M., et al., *P.*, Journ. Econ. Ent., 33: 206-207, 1940; Walton, W. R., et al., *P.*, Proc. Ent. Soc. Wash., 42: 27-30, 1940; Osborn, H., *P.*, Fragments Ent. Hist., p. 226, 1937.
- AINSLIE, George Gooding. (1886-1930). Larrimer, W. H., et al., *B.*, *P.*, Journ. Econ. Ent., 24: 567-569, 1931; Davis, J. J., Ann. Ent. Soc. Amer., 24: 188, 1931; Osborn, H., *P.*, Fragments Ent. Hist., p. 218, 1937.
- AITKEN, Edward Hamilton. (1851-1909). *A.*, Journ. Bombay N. H. Soc., 19: 540-543, 1909.
- ALBARDA, J. Hermann. ( -1899). *A.*, Tidschr. Ent., 42 (Verslag): 38-39, 1899.
- ALBARDA, W. ( -1899). *A.*, Tidschr. Ent., 42 (Verslag): 38, 1899.
- ALBERT, Ernst. (1859-1936). Knoch, V., Ent. Ztschr. (Frankfurt), 50: 393-395, 1936; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 65, 1937.
- ALBERTIS, Luigi Maria d'. (1841-1901). Musgrave, A., Bib. Austr. Ent., p. 60, 1932.
- ALBERTUS, Magnus. (1193-1280). Locy, W. A., *P.*, Story of Biol., pp. 92-97, 1925.
- ALBIN, Eleazar. (1713?-1759?). Weiss, H. B., Sci. Mo., 23: 558-560, 1926; Duméril, A. M. C., Consid. Gén. sur la classe des Ins., p. 247, 1823.
- ALBINUS, Bernhard Siegfried. (1697-1770). Nordenskiöld, Erik, Hist. of Biol., pp. 258-259, 1935.
- ALBRICH, John Merton. (1866-1934). Walton, W. R., Proc. Ent. Soc., 36: 180-183, 1934; Townsend, C. H. T., *P.*, Rev. Ent. (Rio de J.), 4: 277, 1934; Melander, A. L., *B.*, *P.*, Psyche, 41: 133-149, 1934; Walton, W. R., *P.*, Proc. Ent. Soc. Wash., 37: 53-59, 1935; Cresson, E. T., Jr., Ent. News, 45: 202, 1934; Hunger-

- ford, H. B., *Ann. Ent. Soc. Amer.*, 28: 179, 1935; Wade, J. S., *Proc. Ent. Soc. Wash.*, 38: 102-103, 1936; Osborn, H., *P., Fragments Ent. Hist.*, pp. 211-212, 1937.
- ALDROVANDI, Ulysse. (1522-1605). Locy, W. A., *Story of Biol.*, pp. 298-302, 1925; Duméril, A. M. C., *Consid. Gén. sur la Classe les Ins.*, p. 243, 1823.
- ALFÉRAKY, S. N. (See Alphéraky).
- ALLEN, Anson. (1829-1884). Fernald, C. H., *Can. Ent.*, 16: 43-44, 1884.
- ALLIS, Thomas Henry. (1817-1870). *A., Ent. Mo. Mag.*, 7: 90-91, 1870.
- ALPHÉRAKY, Serghyei Nikolaevich. (1850-1902). *A., Leopoldina*, 38: 77, 1902; Oberthür, C., *P. Études Léop. Comp.*, 10 (plates): unpagéd, 1915.
- AMMITZBOLL, Ivar Frederik Christian. (1847-1934). Henriksen, K. L., *P., Ent. Meddel.*, 19: 181-183, 1935.
- AM STEIN, Johann Rudolf. (1777-1862). *Am Stein, J. G., Jahresb. Nat. Ges. Graubünden*, 7: 178-187, 1862; Wolf, R., *4-Jahresschr. Nat. Ges. Zürich*, 8: 217, 1863.
- AMYOT, Charles Jean Baptiste. (1799-1866). Signoret, V., *B., Ann. Soc. Ent. France*, (4) 6: 603-606, 1866.
- ANCEY, César Marie Félix. (1860-1906). *A., P., Nautilus*, 22: 11-12, 1908; Fisher, H., *P., Journ. Conch.*, 55: 404-412, 1908; Musgrave, A., *Bib. Austr. Ent.*, p. 4, 1932.
- ANDERSEN, Lars. (1843-1920). Holstebro, H. O., *B., P., Ent. Meddel.*, 13: 293-295, 1921; Henriksen, K. L., *B., P., Ent. Meddel.*, 15: 423-424, 1936.
- ANDRÉ, Edmond. (1844-1891). Grouvelle, A., *Ann. Soc. Ent. France*, 60 (Bull.): v, 1891; André, E., *Species des Hymenopt.*, 5 (unpagéd): 1891; *A., Ent. News*, 2: 80, 1891; Godman, F. D., *Trans. Ent. Soc. Lond.*, (Proc.): 1-li, 1891; *A., Ent. Mo. Mag.*, 27: 80, 1891; "T. D.", *Il Nat. Siciliano*, 10: 91-92, 1891; *A., Insect Life*, 3: 428, 1891.
- ANDRÉ, Ernest. (1838-1914). Allaud, C., *Bull. Soc. Ent. France*, p. 221, 1914; *A., Miscellanea Ent.*, 22(3-4): 13, 1914.
- ANDRES, Adolf. (1874-1931). Gassner, L., *Koleopt. Rundschau*, 17: 255-256, 1931.
- ANDREWS, William Valentine. (1811-1878). *A., Can. Ent.*, 10: 240, 1878; *A., Ann. Rpt. Ent. Soc. Ont.*, 10: 35-36, 1879.
- ANGAS, George French. (1822-1886). "J. D. H.", *Proc. Linn. Soc. Lond.*, pp. 33-34, 1886-87; *A., Austr. Encycl.* 3rd ed., 1: 58, 1927; Musgrave, A., *Bib. Austr. Ent.*, p. 5, 1932.
- ANGUS, James. ( ). Moffat, J. A., *Ann. Rpt. Ent. Soc. Ont.*, 34: 103-108, 1903.
- ANNANDALE, Thomas Nelson. (1876-1924). Calvert, P. P., *Ent. News*, 35: 264, 1924; *A., Journ. Bombay Nat. Hist. Soc.*, 30: 213-214, 1925.
- ANSLIJN, Nicolaas. (1777-1838). MacGillivray, D., *Ent. Berichten*, 10: 87-88, 1938.
- APFELBECK, Viktor. (1859-1934). *A., Koleopt. Rundschau*, 20: 244, 1934; Heikertinger, F., *Koleopt. Rundschau*, 21: 55, 1935; Horn, W., *Arb. morph. taxon. Ent. Berlin-Dahlem*, 1: 309, 1934; Horn, W., *Arb. phys. angew. Ent. Berlin-Dahlem*, 1: 306-307, 1934.
- ARANGUA, Eduardo Varas. (1900?-1930). Porter, C. E., *B., P., Rev. Chilena Hist. Nat.*, 34: 254-257, 1930.
- ARCAS, Laureano Perez. (1824-1894). Kraatz, G., *Deutsche Ent. Ztschr.*, 39: 7, 1895; Sáez, M., *B., P., Anal. Soc. Espan. Hist. Nat.*, 23: 278-296, 1894.
- ARGOOD, Robert. (1897-1915). Berland, L., *P., Ann. Soc. Ent. France*, 89: 418-419, 1920.
- ARISTOTLE. (384 B.C.-322 B.C.). Sachse, C. T., *Allgem. Deutsch. Naturh. Zeit.*, 2: 444-448, 1847; Nordenskiöld, Erik, *Hist. of Biol.*, pp. 34-44, 1935; Locy, W. A., *P., Story of Biol.*, pp. 21-34, 1925.
- ARMITAGE, Edward. (1817-1896). *A., Trans. Ent. Soc. Lond.*, (Proc.): xcii-xciii, 1896.
- ARNOLD, Charles. ( -1883). *A., Ann. Rpt. Ent. Soc. Ont.*, 14: 81, 1883; *A., Can. Ent.*, 15: 177-178, 1883.
- ARRIBALZAGA, Felix Lynch. (See under Lynch-Arribalzaga).
- ASCANIUS, Peter. (1723-1803). Henriksen, K. L., *P., Ent. Meddel.*, 15: 35-37, 1921; Fée, A. L. A., *Mem. Soc. Sci. Lille*, 1: 166-169, 1831 (1832).

- ASHBY, Edward Bernard. (1876-1936). Turner, H. J., *Ent. Record*, 48: 12, 1936.
- ASHDOWN, W. J. (1855-1919). *A.*, *Ent. Mo. Mag.*, 56: 17, 1920.
- ASHMEAD, William Harris. (1855-1908). *A.*, *P.*, *Ent. News*, 19: 397-398, 1908; Bethune, C. J. S., *Can. Ent.*, 40: 437-438, 1908; Bethune, C. J. S., *Ann. Rpt. Ent. Soc. Ont.*, 39: 150, 1908; Howard, L. O., *Proc. Wash. Acad. Sci.*, 10: 187-189, 1908; Howard, L. O., et al., *B.*, *P.*, *Proc. Ent. Soc. Wash.*, 10: 126-156, 1908; Howard, L. O., et al., *Journ. Econ. Ent.*, 1: 409-410, 1908; Smith, J. B., *P.*, *Pop. Sci. Mo.*, 76: 473, 1910; Howard, L. O., *Dict. Amer. Biog.*, 1: 392-393, 1928; Horn, W., *P.*, *Deutsche Ent. Ztschr.*, pp. 168-169, 1909; Wade, J. S., *Proc. Ent. Soc. Wash.*, 38: 103-104, 1936; Semenov-Tian-Shansky, A., *Rev. Russe Ent.*, 8: 350, 1908; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 187, 1937.
- ASHTON, T. B. (1826-1895). Knaus, W., *Ent. News*, 7: 96: 1896.
- ATKIN, Thomas. (1813-1879). Carrington, J. T., *Entomologist*, 13: 24, 1880.
- ATKINSON, Edwin Felix Thomas. (1840-1890). *A.*, *Ent. Mo. Mag.*, 26: 329, 1890; *A.*, *Ent. News*, 2:40, 1891; Walsingham, T. DeG., *Trans. Ent. Soc. Lond.*, (Proc.): lix, 1890; "F.", *Krancher's Ent. Jahrb.*, p. 197, 1892.
- ATKINSON, George Francis. (1854-1918). *A.*, *Nature*, 102: 370-371, 1919; *A.*, *Science*, 48: 571, 1918; *A.*, *Science*, 49: 230, 1919; Farlow, W. G., et al., *Amer. Journ. Bot.*, 6: 301-302, July, (*P.* Oct. no.), 1919; Fitzpatrick, H. M., *B.*, *Amer. Journ. Bot.* 6: 303-308, 1919; Fitzpatrick, H. M., *Science*, 49: 371-372, 1919; Lloyd, C. G., *P.*, *Mycological Notes* no. 59, 5: 845-846, 1919; Murrill, W. A., *Journ. N. Y. Bot. Gard.*, 19: 314-315, 1919; Murrill, W. A., *Mycologia*, 11: 95-96, 1919; Whetzel, H. H., *P.*, *Bot. Gazette*, 67: 366-368, 1919; Whetzel, H. H., *P.*, *Guide to Nature*, 12: 70-72, 1919.
- ATKINSON, Norman Jefcoate. (1902-1933). Hungerford, H. B., *Ann. Ent. Soc. Amer.*, 26: 187-188, 1933.
- ATMORE, Edward A. (1855-1930). Turner, H. J., *Ent. Record*, 42: 160, 1930; Jordan, K., *Proc. Ent. Soc. Lond.*, 5: 130, 1931.
- ATTWOOD, R. W. ( -1941). Wakely, S., *P.*, *Proc. & Trans. So. Lond. Ent. & N. H. Soc.*, 2: 73, 1941-42.
- AUBÉ, Charles. (1802-1869). Laboulbène, A., *B.*, *P.*, *Ann. Soc. Ent. France*, (4) 9: 601-612, 1869; Deyrolle, E., *Pet. Nouv. Ent.*, 1: 27, 1869; Kraatz, G., *Berlin. Ent. Ztschr.*, 13: iv, 1869; Kraatz, G., *Berlin. Ent. Ztschr.*, 14: xi, 1870.
- AUDINET-SERVILLE, Jean Guillaume. (See under Serville).
- AUDOIN, Jean Victor. (1797-1841). Duponchel, P. A. J., *Ann. Soc. Ent. France*, (1) 11: 96-164, 1842; Swainson, W., *B.*, *Bib. of Zool.*, pp. 115-116, 1840; Westwood, J. O., *Arcana Ent.*, 1: 155-159, 1842; Serre, P. M. T., de, et al., *B.*, *Ann. Sci. Nat.*, (2) 16: 356-378, 1841.
- AURIVILLIUS, Per Olof Christopher. (1853-1928). *A.*, *Ent. Record*, 40: 167, 1928; Tullgren, A., *B.*, *P.*, *Ent. Tidskr.*, 49: 171-178, 1928; Bryk, F., *B.*, *Ent. Tidskr.*, 44: 1-55, 1923; Musgrave, A., *B.*, *Bib. Austr. Ent.*, p. 8, 1932; Porter, C. E., *Rev. Chilena Hist. Nat.*, 32: 394, 1928.
- AUSTEN, Ernest Edward. (1867-1938). Blair, K. G., *Ent. Mo. Mag.*, 74: 42-43, 1938; Riley, N. D., *Entomologist*, 71: 72, 1938; Horn, W., *Arb. morph. taxon. Ent. Berlin-Dahlem*, 5: 186, 1938; Musgrave, A., *B.*, *Bib. Austr. Ent.*, p. 8, 1932.
- AUXER, Samuel. (1835-1909). *A.*, *Ent. News*, 20: 96, 1909.
- BABCOCK, Amory Leland. (1826-1903). Morse, A. P., *Psyche*, 10: 187, 1903.
- BABINGTON, Charles Cardale. (1808-1895). *A.*, *Ent. Mo. Mag.*, 31: 220-221, 1895; Britten, J., *P.*, *Journ. Bot. (Lond.)*, 33: 257-266, 1895; "J. B. B.", *Proc. Roy. Soc. Lond.*, 59: viii-x, 1896.
- BACH, Michael. (1808-1878). *A.*, *Leopoldina*, 14: 115-117, 1878; *A.*, *Ber. Senckenb. Nat. Ges.*, p. 10, 1878.
- BACOT, Arthur William. (1866-1922). *A.*, *Ent. News*, 33: 255-256, 1922; Greenwood, M., *Lond. Nat.*, pp. 24-32, 1923, (*P.* p. 1); Imms, A. D., *Ann. Appl. Biol.*, 9: 175-176, 1922; Prout, L. B., et al., *Entomologist*, 55: 143-144, 1922; Ledingham, J. C. G., *B.*, *P.*, *Lister Inst. Prev. Med.*, *Coll. Papers* no. 18, 1st paper (reprinted from *Brit. Journ. Exp. Path.*), 3: 117-124, 1922; Rothschild, L. W.,

- Trans. Ent. Soc. Lond., (Proc.): cxix-cxx, 1922; Page, H. E., Ent. Record, 34: 99-100, 1922; *A.*, Ent. Mo. Mag., 58: 115-116, 1922.
- BAER, Carl Ernst von. (1792-1876). Kobell, W. X. F. von, Sitzbr. Bayer. Akad. Wiss. München, 7: 142-145, 1877; Lucae, J. C. G., Ber. Senckenb. Nat. Ges., pp. 6-7, 47-71, 1876-77; Müller, K., *P.*, Natur, 26: 39-40, 1877; Dragendorff, G., et al., Sitzber. Nat. Ges. Dorpat, 4: 282-305, 1876; Zaddach, G., Schrift. phys.-ökon. Ges. Königsb., 18: 27-48, 1877; Locy, W. A., Story of Biol., p. 326, 1925; Nordenskiöld, Erik, *P.*, Hist. of Biol., pp. 363-366, 1935; Stricker, W., Zool. Garten, 18: 71, 1877; *A.*, Proc. Amer. Acad. Arts & Sci., vol. 12, pp. 331-335, 1876-77; Wasmann, E., Biol. Centralbl., 17: 799-800, 1897.
- BAER, Gustave Adolphe. (1839-1918). *A.*, Bull. Soc. Ent. France, pp. 43-54, 1918; *A.*, Ent. News, 29: 280, 1918.
- BAER, William. (1867-1934). Zwölfer, W., Ztschr. Angew. Ent., 22: 516, 1935.
- BAILEY, James Spencer. ( -1883). *A.*, Ann. Rpt. Ent. Soc. Ont., 14: 82, 1883; *A.*, Can. Ent., 15: 179, 1883; Edwards, H., Papilio, 3: 166-167, 1883.
- BAINBRIDGE, William George. (1867-1935). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 2: 308, 1935.
- BAIRD, William. (1803-1872). *A.*, Amer. Journ. Sci., (3) 3: 319-320, 1872; *A.*, Proc. Linn. Soc. Lond., pp. lviii-lx, 1871-72; *A.*, Athenaeum, Feb. 3, p. 148, 1872; *A.*, Proc. Roy. Soc. Lond., 20: xxiii-xxiv, 1871-72.
- BAKER, Charles Fuller. (1872-1927). Calvert, P. P., Ent. News, 38: 261-262, 1927; Essig, E. O., *P.*, Philipp. Journ. Sci., 35: 429-436, 1928; Essig, E. O., *P.*, Journ. Econ. Ent., 20: 748-754, 1927; Hoffmann, W. E., *P.*, Lingnaam Agr. Rev., 4: 197-202, 1927; Welles, C. G., Science n. s., 66: 229-230, 1927; "E. S." et al., *P.*, Philipp. Agr., 16: Special Number, 1928; *A.*, Science, n. s., 69: 377, 1929; Leon, H., pub. by Acad. Cienc. Med., Fis. y Nat. Habans, pp. 1-28, 1929; Musgrave, A., *B.*, Bib. Austr. Ent., p. 10, 1932; Osborn, H., *P.*, Fragments Ent. Hist., 1937.
- BAKEWELL, Robert. (1810-1867). *A.*, Ent. Mo. Mag., 4: 211, 1868; Musgrave, A., Bib. Austr. Ent., p. 10, 1932.
- BALDUS, Karl. (1898-1927). *A.*, Science( n. s., 66: 129, 1927; *A.*, Ent. News, 38: 262, 1927; Spek, J., Zool. Anzeiger, 73: 48, 1927.
- BALKWILL, John A. ( -1908). Bethune, C. J. S., Can. Ent., 40: 438, 1908; Jarvis, T. D., Ann. Rpt. Ent. Soc. Ont., 39: 34, 1908.
- BALL, Elmer Darwin. (1870-1943). De Long, D. M., Journ. Econ. Ent., 37: 159, 1944; Osborn, H., et al., *P.*, Proc. Ent. Soc. Wash., 46: 21-22, 1944; Vorhees, C. T., Science, 98: 506-507, 1943; Osborn, H., *P.*, Fragments Ent. Hist., p. 198, 1937; Vorhies, C. T., Ann. Ent. Soc. Amer., 37: 129-130, 1944.
- BALL, Robert. (1802-1857). Patterson, R., *B.*, Proc. Dublin Zool. & Bot. Assoc., 1: 7-48, 1859.
- BALLARD, Julia Perkins. ( -1894). "W. H. E.", Can. Ent., 26: 234, 1894.
- BALLION, Ernst von. (1816-1901). Semenov, A., *B.*, Rev. Russe Ent., 1: 297-299, 1901; *A.*, Leopoldina, 38: 77, 1902.
- BALY, Joseph Sugar. (1816-1890). Sharp, D., Entomologist, 23: 197-200, 1890; *A.*, Ent. Mo. Mag., 26: 142, 1890; "F.", Krancher's Ent. Jahrb., p. 195, 1892; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 11-12, 1932; *A.*, Proc. Linn. Soc. Lond., pp. 92-93, 1889-90.
- BANFIELD, Edmund James. (1852-1923). Musgrave, A., *B.*, Austr. Ent., p. 12, 1932.
- BANG-HAAS, Andreas. (1846-1925). *A.*, Ent. News, 36: 128, 1925; Henriksen, K. L., *P.*, Ent. Medd., 16: 28-29, 1925; Seitz, A., Ent. Rundschau, 42: 9, 1925; Hedicke, H., Deutsche Ent. Ztschr., pp. 87-88, 1925.
- BANKES, Eustace Ralph. (1861-1929). *A.*, Ent. Mo. Mag., 66: 63, 1930; Adkin, R., Entomologist, 63: 47-48, 1930; Jordan, K., Proc. Ent. Soc. Lond., 5: 130-131, 1931.
- BANKS, Joseph. (1743-1820). Musgrave, A., *B.*, Bib. Austr. Ent., pp. 12-14, 1932.
- BAR, Constant. (1817-1884). Dimmock, G., Psyche, 4: 266, 1885; Honrath, E. G., Berl. Ent. Ztschr., 31: 151-152, 1887, 32: 13-14, 1888; Lefèvre, E., Ann. Soc. Ent. France, (6) 4 (Bull.): clvii, 1884.
- BARAN, Gabriel de. (1830-1864). Allard, E., Ann. Soc. Ent. France, (4) 4: 734-736, 1864.
- BARGAGLI, Pietro. ( -1918). Senna, A., *B.*, Bull. Soc. Ent. Ital., 50: 84-85, 1919.

- BARNARD, George. (1830-1894). *A.*, Entomologist, 27: 228, 1894; Musgrave, A., Bib. Austr. Ent., p. 14, 1932.
- BARNARD, William Stebbins. (1849-1887). Wilder, B. G., Amer. Nat., 21: 1136-1137, 1887; Wade, J. S., Proc. Ent. Soc. Wash., 38: 105, 1936; Osborn, H., *P.*, Fragments Ent. Hist., pp. 179-180, 1937.
- BARNES, William. (1860-1930). Schaus, W., et al., *P.*, Proc. Ent. Soc. Wash., 32: 114, 1930; *A.*, Ent. News, 41: 214, 1930; Engelhardt, G. P., Bull. Bklyn. Ent. Soc., 25: 143-144, 1930; Davis, J. J., Ann. Ent. Soc. Amer., 24: 188, 1931; Jordan, K., Proc. Ent. Soc. Lond., 5: 131, 1931; Osborn, H., *P.*, Fragments Ent. Hist., p. 214, 1937.
- BARNEVILLE, Henri Brissont de. ( -1887). Dimmock, G., Psyche, 5: 35, 1888.
- BARNES, Thomas Alexander. (1881-1930). Talbot, G., Entomologist, 63: 119-120, 1930.
- BARRETT, Charles Golding. (1836-1904). Walker, J. J., Ent. Mo. Mag., 41: 25-27, 1905; *A.*, Entomologist, 38: 32, 1905; Wheeler, F. D., Trans. Norfolk & Norwich Nat. Soc., 8: 152-154, 1905.
- BARRETT, Lucas. (1837-1862). *A.*, Proc. Linn. Soc. Lond., pp. xxxi-xxxiv, 1863.
- BARROWS, Walter Bradford. (1855-1923). "W. A. H.", Journ. Econ. Ent., 18: 563-564, 1925.
- BARTHOLOMAEUS, Anglicus. (?1190-?1250). Locy, W. A., Story of Biol., pp. 99-101, 1925.
- BARTRAM, John. (1699-1777). *A.*, *P.*, Harper's Mag., 60: 321-330, 1880; Darlington, W., Amer. Journ. Sci., (2) 9: 85-105, 1850; Dock, M. L., *P.*, Garden & Forest, 9: 121-124, 1886; Kelly, H. A., Some Amer. Med. Botanists, pp. 49-59, 1914; "L.", *P.*, Garden Mo., 2: 271-273, 1860; Repplier, A., Philadelphia, the place and its people (Macmillan, N. Y.), pp. 168-171, 1912; Youmans, W. J., Pioneers of science in America, pp. 24-39, 1896.
- BARTRAM, William. (1739-1823). Gee, W., B., Univ. S. C. Bull., 72: 17-19, 1918; Youmans, W. J., *P.*, Pioneers of science in America, pp. 24-39, 1896.
- BARTSCHT, Ambros. (1828-1904). *A.*, Leopoldina, 40: 94, 1904.
- BASSETT, Homer Franklin (1826-1902). *A.*, Ent. Mo. Mag., 38: 289, 1902; *A.*, *P.*, Ent. News, 13: 203-205, 1902; *A.*, *P.*, Nat. Cyclop. Amer. Biog., 6: 481, 1896; Fowler, W. W., Trans. Ent. Soc. Lond., (Proc.): lix, 1902; Osten Sacken, C. R., Record of my life and work in entomology, p. 40, 1903; Essig, E. O., *P.*, Hist. of Ent., pp. 552-553, 1931; Osborn, H., *P.*, Fragments Ent. Hist., p. 216, 1937.
- BASTER, Job. (1711-1775). Swainson, W. B., Bib. of Zool., p. 122, 1840.
- BATES, Frederick. (1829-1903). *A.*, Ent. Mo. Mag., 39: 286-287, 1903; Donisthorpe, H., B., Ent. Record, 15: 347-349, 1903; Musgrave, A., B., Bib. Austr. Ent. pp. 15-16, 1932.
- BATES, George Latimer. ( -1940). Riley, N. D., Entomologist, 73: 95-96, 1940; Kinnear, N. B., Nature, 145: 291, 1940.
- BATES, Henry Walter. (1825-1892). *A.*, Ent. News, 3: 72, 1892; *A.*, Ent. Record, 3: 59, 1892; *A.*, Psyche, 6: 249-250, 1892; Godman, F. D., Trans. Ent. Soc. Lond. (Proc.) pp. i-iv, 1892; McLachlan, R., Ent. Mo. Mag., 28: 83-85, 1892; *A.*, Cent. Hist. Ent. Soc. Lond., pp. 143-144, 1933; Nordenskiöld, Erik, Hist. of Biol., p. 485, 1935; Musgrave, A., B., Bib. Austr. Ent. p. 16, 1932.
- BATESON, William. (1861-1926). *A.*, Ent. Mo. Mag., 62: 64-65, 1926; Lucas, W. J., *P.*, Entomologist, 59: 97-99, 1926; Cockayne, W., Ent. Record, 38: 47-48, 1926; Morgan, T. H., Proc. Linn. Soc. Lond., pp. 66-74, 1925-26; Poulton, E. B., Proc. Ent. Soc. Lond., 1: 71-73, 1926.
- BATTY, James. (1831-1893). Hall, A. E., Ent. Mo. Mag., 29: 287-288, 1893; Hall, A. E., Entomologist, 26: 368, 1893.
- BAUDI DI SELVE, Flaminio. (1821-1901). *A.*, Bull. Soc. Ent. Ital., 34: 118-119, 1902; *A.*, Bull. Soc. Ent. France, p. 293, 1901; Camerano, L., B., Boll. Mus. Zool. ed Anat. Comp. Torino, 16: no. 396, pp. 1-6, 1901.
- BAUER, Viktor. ( -1927). *A.*, Zool. Anzeiger, 74: 144, 1927.
- BAUHIN, Caspar. (1569-1624). Nordenskiöld, Erik, Hist. of Biol., p. 194, 1935.
- BAUMHOFFER, Lynn G. (1895-1942). Orr, L. W., et al., Journ. Econ. Ent. 35: 610, 1942; Orr, L. W., et al., *P.*, Proc. Ent. Soc. Wash., 45: 67-71, 1943.
- BAUR, George. (1859-1898). Wheeler, W. M., B., *P.*, Amer. Nat., 33: 15-30, 1899.



- BAYLIS, Ernest. (1877-1930). Lutz, J. C., *P.*, Ent. News, 41: 285-286, 1930.
- BEARE, Thomas Hudson. (1859-1940). Donisthorpe, H., Ent. Record, 52: 107-108, 1940; Donisthorpe, H., Ent. Mo. Mag., 76: 187, 1940.
- BEAUMONT, Alfred. (1832-1905). Porritt, G. T., Ent. Mo. Mag., 41: 95-97, 1905; *A.*, Entomologist, 38: 120, 1905.
- BEAUMONT, Elie de. (See under Elie de Beaumont).
- BEAUVOIS, Palisot de. (See under Palisot de Beauvois).
- BECCARI, Odoardo. (1843-1920). *A.*, Ent. News, 32: 160, 1921.
- BECHER, Eduard. (1856-1886). Dimmock, A., *Psyche*, 5: 35, 1888; Mik, J., et al., *Wien. Ent. Zeit.*, 5: 352, 1886.
- BECK, Richard. (1827-1866). Newman, E., Entomologist, 3: 168b, 1866.
- BECKER, Alexander. (1818-1901). Wiren, R., *B.*, *P.*, Rev. Russe Ent., 1: 130-133, 1901.
- BECKER, Johann Joseph Maria. (1788-1859). Heyden, C. von, *Stett. Ent. Zeit.*, 21: 37, 1860.
- BECKER, Theodor. (1840-1928). Lichtwardt, B., *B.*, Konowia, 7: 307-310, 1928; Collin, J. E., Proc. Ent. Soc. Lond., 3: 103, 1929; *A.*, *Wien. Ent. Zeit.*, 45: 104, 1928; Hermann, F., et al., *B.*, *Zool. Jahrb., Syst.*, 43: 1-12, 1920.
- BEDÉL, Ernest Marie Louis. (1849-1922). *A.*, Ent. News, 33: 256, 1922; *A.*, Bull. Soc. Ent. France, pp. 33-34, 46, 1922; Sainte-Claire Deville, C. J., *B.*, Ann. Soc. Ent. France, 91: 165-189, 1922; Champion, G. C., et al., Ent. Mo. Mag., 59: 139-140, 1923; Horn, W., *P.*, Suppl. Ent., 12: 6-7, 1926; Peyerimhoff, P. de, *P.*, *Livre Cent. Ent. Soc. France*, pp. 83-85, 1932; Bedél, M., *l. c.*, pp. 95-98, 1932.
- BEDÉL, George. (1805-1877). Douglas, J. W., Ent. Mo. Mag., 14: 22, 1877.
- BEDFORD, Gerald Augustus Harold. (1891-1938). Munro, H. K., *P.*, Journ. Ent. Soc. So. Afr., 1: 149-150, 1939; Sachtleben, H., Arb. phys. angew. Ent. Berlin-Dahlem, 6: 209, 1939.
- BEHN, Wilhelm Friedrich Georg. (1808-1878). *A.*, Ent. Nachr., 4: 163-165, 1878; Geinitz, E., Sitzb. Naturw. Ges. Isis Dresden, pp. 11-13, 1878 (1879); *A.*, Leopoldina, 14: 68-71, 1878.
- BEHR, Hans Herman. (1818-1904). *A.*, Ent. News, 15: 142-144, 1904; Cottle, J. E., Pan-Pacific Ent., 3: 75-76, 1926; Eastwood, A., Science, n. s., 19: 636, 1904; *A.*, Leopoldina, 40: 72, 1904; Musgrave, A., Bib. Austr. Ent., p. 17, 1932; Essig, E. O., *P.*, Hist. of Ent., pp. 553-556, 1931.
- BEHRENS, James. (1824-1898). Ehrhorn, E. M., Ent. News, 9: 128, 1898; Essig, E. O., *P.*, Hist. of Ent., pp. 556-557, 1931.
- BELFRAGE, Gustaf Wilhelm. (1834-1882). Geiser, S. W., Southwest Review, 14: 381-398, 1929; Geiser, S. W., Ent. News, 44: 127-132, 1933; Geiser, S. W., Field & Lab., 4: 44, 1936; Geiser, S. W., Naturalists of the frontier, pp. 290-308, 1937; Osborn, Fragments Ent. Hist., p. 33, 1937.
- BELING, Theodor. (1816-1898). Alexander, C. P., *B.*, *P.*, Mem. Cornell Univ. Agr. Exp. Sta. no. 38, p. 693, 1920; *A.*, *Wien. Ent. Zeit.*, 18: 132, 1899; Kraatz, G., Deutsche Ent. Ztschr., 43: 222, 1899.
- BELL, Thomas. (1792-1880). *A.*, Leopoldina, 16: 94, 1880; *A.*, Zool. Anzeiger, 3: 168, 1880.
- BELLANI, Angelo. (1776-1852). Veladini, G., Giorn. R. Istit. Lombardo, 9: 485, 1856.
- BELLEVOYE, Adolphe Nicolas. (1830-1908). Fleur, E., *B.*, Bull. Soc. Hist. Nat. Metz, (3) 4: 77-85, 1913; Delamaison, L., Bull. Soc. Hist. Nat. Reims, 17: 115-116, 1908.
- BELLIÉRE DE LA CHAVIGNERIE, Jean Baptiste Eugène. (1819-1888). Régimbart, M., *B.*, Ann. Soc. Ent. France, (6) 8: 449-452, 1888; Selys-Longchamps, E. de, Ann. Soc. Ent. Belg., 32: (C. R.) xci-xcii, 1888; Oberthür, C., *P.*, Études Lép. Comp., 11: unpagéd, 1916.
- BELON, Marie Joseph Paul. (1839-1912). Argod-Vallon, A., *B.*, *P.*, Ann. Soc. Ent. France, 83: 136-140, 1914; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 17-18, 1932.
- BELON, Pierre. (1517-1564). Locy, W. A., *P.*, Story of Biol., pp. 286-287, 1925.
- BENGTSOON, Simon Frederik. (1860-1939). Sachtleben, H., Arb. morph. taxon. Ent. Berlin-Dahlem, 7: 76, 1940; Henriksen, K. L., *P.*, Ent. Meddel., 20: 589-591, 1940.

- BENJAMIN, Foster Hendrickson. (1895-1936). Muesebeck, C. F. W., et al., *P.*, *Proc. Ent. Soc. Wash.*, 38: 25-26, 1936; *A.*, *Ent. News*, 47: 112, 1936; Muesebeck, C. F. W., *Journ. Econ. Ent.*, 29: 226, 1936; Mickel, C. E., *Ann. Ent. Soc. Amer.*, 30: 181, 1937; Horn, W., *Arb. phys. angew. Ent. Berlin-Dahlem*, 3: 161, 1936; Osborn, H., *P.*, *Fragments Ent. Hist.*, pp. 247-248, 1937.
- BENNETT, George. (1804-1893). Musgrave, A., *B.*, *Bib. Austr. Ent.*, p. 18, 1932.
- BENNETT, William Henry. (1862-1931). Donisthorpe, H., *Ent. Record*, 43: 92, 1931.
- BENSEL, Gustave Emile. (1876-1928). Carter, W., *Journ. Econ. Ent.*, 21: 516-517, 1928.
- BENTELI, Franz. (1824-1899). Rätzer, A., *Mitt. Schweiz. Ent. Ges.*, 10: 205-210, 1899.
- BENTLEY, William. (1789-1859). *A.*, *Ent. Weekly Intell.*, 7: 105-106, 1859.
- BENTON, Frank. (1852-1919). Wade, J. S., *Proc. Ent. Soc. Wash.*, 38: 105-106, 1936.
- BERCE, Jean Etienne. (1802-1879). Clement, A. L., *Ann. Soc. Ent. France*, (5) 10: 177-180, 1880; *A.*, *Ent. Mo. Mag.*, 16: 236, 1880; *A.*, *Psyche*, 3: 71, 1880; Fitch, E. A., *Entomologist*, 13: 119-120, 1880; *A.*, *Ent. Nachr.*, 6: 150, 1880; *A.*, *Zool. Anzeiger*, 3: 144, 1880; *A.*, *Naturaliste*, 2: 167-168, 1880.
- BERENDT, Georg Carl. (1790-1850). Hagen, H. Stett, *Ent. Zeit.*, 11: 299-302, 1850.
- BERG, Frederico Guillermo Carlos. (1843-1902). Gallardo, A., *B.*, *P.*, *An. Mus. Nac. Buenos Aires*, (2) 4: ix-xl, 1902; *A.*, *Leopoldina*, 38: 77, 1902; Fowler, W. W., *Trans. Ent. Soc. Lond.*, (Proc.), p. lviii, 1902; Porter, C. E., *Rev. Chilena Hist. Nat.*, 6: 58, 1902; Semenov, A., *Rev. Russe Ent.*, 2: 130-131, 1902; Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930; Osborn, H., *P.*, *Fragments Ent. Hist.* 1937.
- BERGENSTAMM, Julius von. (1837-1896). *A.*, *Leopoldina*, 32: 58, 1896; Brauer, F., *Ann. Naturh. Hofmus. Wien*, 11: (Notizen) 55, 1896; Mik, J., et al., *Wiener Ent. Zeit.*, 15: 84, 1896.
- BERGROTH, Ernst Evald. (1857-1925). Barber, H. G., *Ent. News*, 37: 190-192, 1926; Forsius, R., *P.*, *Notulae Ent.*, 5: 101-105, 1925; Parshley, H. M., *P.*, *Bull. Bklyn. Ent. Soc.*, 21: 15-17, 1926; China, W. E., *Entomologist*, 59: 48, 1926; China, W. E., *Ent. Mo. Mag.*, 62: 63-64, 1926; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 19-20, 1932; Lindberg, H., *B.*, *P.*, *Mem. Soc. Fauna et Flora Fenn.*, 4: 292-317, 1928; Hedicke, H., *Deutsche Ent. Ztschr.*, p. 440, 1925; Osborn, H., *P.*, *Fragments Ent. Hist.*, 1937.
- BERLEPSCH, August. (1815-1877). Müller, K., *Natur*, 3: 612, 1877.
- BERLESE, Antonio. (1863-1927). *A.*, *Ent. News*, 39: 32, 1928; Davidson, J. P., *Ann. Appl. Biol.*, 15: 509-511, 1929; Paoli, G., *B.*, *P.*, *Mem. Soc. Ent. Ital.*, 6: 55-84, 1927; Melis, A., *Redia*, 24: vii-xix, 1938; *A.*, *Ent. Record*, 41: 67, 1929; Catoni, G., et al., *P.*, *Anzeiger f. Schädlingssk.*, 3: 135-138, 1927; Navas, L., *Bol. Soc. Ent. Espan.*, 11: 68-70, 1928; Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930.
- BERNARD, Claude. (1813-1878). *A.*, *Ber. Senckenb. Nat. Ges.*, p. 8, 1878-79; Locy, W. A., *P.*, *Story of Biol.*, pp. 462-470, 1925; Nordenskiöld, Erik, *Hist. of Biol.*, pp. 377-380, 1935.
- BERTHELOT, Sabin. (1794-1880). *A.*, *Leopoldina*, 17: 45-46, 1881.
- BERTKAU, Philipp. (1849-1895). *A.*, *Leopoldina*, 31: 220, 1895; Kraatz, G., *Deutsche Ent. Zeitschr.*, 40: 191-192, 1896.
- BERTOLINI, Stefano di. (1832-1905). Bargagli, P., *Bull. Soc. Ent. Ital.*, 36: 233-239, 1905; Porta, A., *Riv. Col. Ital.*, 3: 105, 1905.
- BERTOLONI, Giuseppe. (1804-1878). *A.*, *B.*, *only*, *Bull. Soc. Ent. Ital.*, 2: 210-213, 1870.
- BERTRAM, Bert. (1895-1928). Musgrave, A., *Bib. Austr. Ent.*, p. 20, 1932; Musgrave, A., *Austr. Mus. Mag.*, 3: 277, 1928; Browne, W. R., *Proc. Linn. Soc. N. S. Wales*, 54: v, 1929.
- BESSER, Wilibald Swibert Joseph Gottlieb von. (1784-1842). Trautvetter, E. R., *B.*, *Bull. Soc. Imp. Nat. Moscou*, 16 (1), 341-360, 1843.
- BEST, Dudley. (1843-1928). Musgrave, A., *B.*, *Bib. Austr. Ent.*, p. 21, 1932; Barnard, F. G. A., *P.*, *Victorian Nat.*, 45: 104-107, 1928.
- BETHUNE, Charles James Stewart. (1838-1932). *A.*, *P.*, *Can. Ent.*, 64, 97-98, 1932; Hungerford, H. B., *Ann. Ent. Soc. Amer.*, 26: 188, 1933; Lyman, H. H., *P.*,



- Can. Ent., 42: 2-3, 1910; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., pp. 171-172, 1937.
- BEUTENMÜLLER, William. (1864-1934). *A.*, Ent. News, 45: 112, 1934; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 1: 309, 1934; Hungerford, H. B., Ann. Ent. Soc. Amer., 28: 179, 1935; Weiss, H. B., Journ. N. Y. Ent. Soc., 51: 286, 1943; Osborn, H., *P.*, Fragments Ent. Hist., p. 232, 1937.
- BEY, Piot. (1857-1935). Brumpt, E., Bull. Soc. Path. Exot., 28: 49-50, 1935.
- BEZZI, Mario. (1869-1927). Aldrich, J. M., Ent. News, 38: 128, 1927; Parisi, B., *P.*, Mem. Soc. Ent. Ital., 6: 165-182, 1927; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 21-22, 1932; *A.*, Wiener Ent. Zeit., 44: 80, 1927.
- BIALINITZKY-BIRULA, Alexei Andreewitsch. (1864-1937). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 242, 1937.
- BIANCONI, Giovanni Giuseppe. (1809-1878). *A.*, Boll. Ccm. Geol. Ital., 9: 548-549, 1878.
- BIBRA, Ernst von. (1806-1878). *A.*, Amer. Journ. Sci., (3) 16: 164, 1878; Knoblauch, H., Leopoldina, 14: 81, 1878.
- BIELZ, Eduard Albert. (1827-1898). Capesius, J., *B.*, Verh. & Mitt. Siebenb. Ver. Naturw., 48: 1-24, 1898.
- BIGOT, Jacques Marie Frangile. (1818-1893). *A.*, Ent. Mo. Mag., 29: 145, 1893; *A.*, Ent. News, 4: 280, 1893; Mik, J., et al., Wien. Ent. Zeit., 12: 232, 1893; Le-fèvre, E., Ann. Soc. Ent. France 62: (Bull.), clxxxvii, 1893; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 22-23, 1932; Kraatz, G., Deutsche Ent. Zeitschr., 37: 5-6, 1893.
- BILLINRHURST, Humphrey Godwin. ((1887-1927). "D. L. M.", Proc. Linn. Soc. Lond., pp. 78-79, 1926-27.
- BILLINGS, Braddish. (1819-1871). *A.*, Can. Ent., 4: 70-73, 1872.
- BILLINGS, Elkanah. (1820-1876). Whiteaves, J. F., Can. Nat., 8: 251-261, 1878; Whiteaves, J. F., Geol. Mag., 4: 43-45, 1877; *A.*, Amer. Journ. Sci., (3) 14: 78-80, 1877.
- BILLUPS, Thomas Richard. (1841-1919). "R. A.", Ent. Mo. Mag., 56: 66, 1920; *A.*, Entomologist, 53: 72, 1920.
- BINGHAM, Charles Thomas. (1848-1908). *A.*, Trans. Ent. Soc. Lond., pp. cvi-cvii, 1908; *A.*, Ent. Mo. Mag., 45: 18, 1909; Kirby, W. F., Ent. Mo. Mag., 45: 36, 1909; Kirby, W. F., Zoologist, 66: 465, 1908; "H. M. L.", Journ. Bombay N. H. Soc., 19: 214-215, 1909; Musgrave, A., *B.*, Bib. Austr. Ent., p. 23, 1932; *A.*, Ent. Record, 20: 267, 1908; Semenov-Tien-Shansky, A., Rev. Russe Ent., 8: 350, 1908; Horn, W., Deutsche Ent. Ztschr. pp. 169-170, 1909.
- BIOLEY, Paul. (1862-1908). "J. A. G. R.", *P.*, Ent. News, 19: 394-395, 1908.
- BIECHOF, Carl Gustav Christoph. (1792-1870). "D. F.", Geol. Mag., 8: 45-47, 1871.
- BISCHOFF, Edwin A. (1866-1923). Leng, C. W., Ent. News, 35: 114, 1924.
- BISHOP, Thomas George. (1846-1922). Ferguson, A., Ent. Mo. Mag., 58: 279-280, 1922.
- BLACHIER, Charles Théodore. (1859-1915). Bull. Soc. Ent. France, p. 250, 1915; Oberthür, C., *P.*, Études Lep. Comp., 11: unpagé, 1916.
- BLACK, James Ebenezer. (1865-1924). "B. D. J.", Proc. Linn. Soc. Lond., pp. 74-75, 1925-26.
- BLACKBURN, John Bickerton. (1845-1881). Carrington, J. T., Entomologist, 14: 301-302, 1881; *A.*, Zool. Anzeiger, 4: 676, 1881.
- BLACKBURN, Thomas. (1844-1912). *A.*, Ent. Mo. Mag., 48: 219, 1912; *A.*, Ent. News, 23: 436, 1912; Morice, F. D., Trans. Ent. Soc. Lond., (Proc.): p. clxviii, 1912; Lea, A., *B.*, (list of species named), *P.*, Trans. Roy. Soc. Austr., 36: v-xl, 1912; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 23-26, 1932; Semenov-Tien-Shanskij, A., Rev. Russe Ent., 12: 639, 1912.
- BLACKMAN, Maulsby Willett. (1876-1943). Craighead, F. C., et al., *B.*, *P.*, Proc. Ent. Soc. Wash., 46: 15-21, 1944; Meusebeck, C. F. W., Ann. Ent. Soc. Amer., 37: 130, 1944.
- BLACKWALL, John. (1789-1881). *A.*, Ent. Mo. Mag., 18: 45, 1881; Pickard-Cambridge, O., Entomologist, 14: 145-150, 1881; *A.*, Psyche, 3: 259, 1882; *A.*, Ent. Nachr., 7: 188, 1881; *A.*, Zool. Anzeiger, 4: 340, 1881; *A.*, Amer. Nat., 15:

- 684, 1881; *A.*, *Proc. Linn. Soc. Lond.*, p. 17, 1880-82.
- BLAINVILLE, Marie Henri Ducrotay de. (1777-1850). Edwards, M., *Ann. Sci. Nat.*, (3) 12: 375-381, 1849 (1850); Nordenskiöld, Erik, *Hist. of Biol.*, pp. 359-361, 1935; *A.*, *B.*, *Rev. & Mag. Zool.*, (2) 2: 291-294, 1850.
- BLAKE, Charles Alfred. (1834-1903). *A.*, *Ent. News*, 33: 311, 1922; *A.*, *P.*, *Ent. News*, 14: 213-215, 1903; Osborn, H., *Fragments Ent. Hist.*, pp. 144-145, 1937.
- BLANC, Edward. ( -1923). *A.*, *Ent. News*, 34: 256, 1923; Rabaud, E., *Bull. Soc. Ent. France*, pp. 48-49, 1923.
- BLANCHARD, Charles Émile. (1819-1900). Giard, A., *Bull. Soc. Ent. France*, p. 41, 1900; Levy, M., *C. R. Acad. Sci. Paris*, Jan.-June, pp. 365-366, 1900; Gaudry, A., et al., *Bull. Must. Hist. Nat. Paris*, pp. 53-59, 1900; Musgrave, A., *B.*, *Bib. Austr. Ent.*, p. 26, 1932; Kraatz, G., *Deutsche Ent. Ztschr.*, 44: 223-224, 1900; Mik, J., *Wien. Ent. Zeit.*, 19: 136, 1900.
- BLANCHARD, Frederick. (1843-1912). Sherman, J. D., Jr., *P.*, *Ent. News*, 24: 46-48, 1913; Sherman, J. D., Jr., *P.*, *Journ. N. Y. Ent. Soc.*, 21: 69-71, 1913.
- BLANCHARD, Raphael Anatole Émile. (1857-1919). *A.*, *Ent. News*, 30: 210, 1919; Garrison, F. H., *Science*, n. s., 49: 391-392, 1919; Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930.
- BLAND, James H. B. (1833-1911). *A.*, *P.*, *Ent. News*, 23: 47, 1912; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 145, 1937.
- BLAND, Thomas. (1809-1885). Dimmock, G., *Psyche*, 5: 35, 1888.
- BLATCH, William Gabriel. ( -1900). Verrall, G. H., *Trans. Ent. Soc. Lond.*, (Proc.): xliii, 1900; *A.*, *Zool. Anzeiger*, 23: 232, 1900.
- BLATCHLEY, Willis Stanley. (1859-1940). Watson, J. R., *Florida Ent.*, 23: 24-25, 1940; *A.*, *Journ. Econ. Ent.*, 33: 588-589, 1940; *A.*, *Ent. News*, 51: 210, 1940; *A.*, *Science*, 91: 539, 1940; Wade, J. S., *Proc. Ent. Soc. Wash.*, 42: 204-208, 1940; Davis, J. J., *Ann. Ent. Soc. Amer.*, 34: 262, 1941; Davis, W. T., *P.*, *Bull. Bkln. Ent. Soc.*, 36: 18-19, 1941; Usinger, R. L., *Pan-Pacific Ent.*, 17: 84, 1941; Davis, J. J., *P.*, *Ann. Ent. Soc. Amer.*, 34: 279-283, 1941; Davis, J. J., *P.*, *Proc. Indiana Acad. Sci.*, 41: 49-51, 1932; Osborn, H., *P.*, *Fragments Ent. Hist.*, pp. 173-174, 1937.
- BLENKARN, Stanley Arthur. (1882-1927). *A.*, *Ent. Mo. Mag.*, 64: 17, 1928.
- BLÖSCH, Charles. (1819-1908). Blösch, E., *B.*, *Mitt. Aargau. Naturf. Ges.*, 11: 99-113, 1909.
- BLOT, Frédéric. (1795-1841). Eudes-Langchamps, J. A., *B.*, *Mem. Soc. Linn. Normandie*, 7: 70-84, 1841.
- BLUMENBACH, Johann Friedrich. (1752-1840). Bölehen, Natur, 12: 121-123, 143-147, 204-206, 238-240, 254-255, 278-280, 294-296, 303-304, 335-339, 351-352, 358-360, 367-368, 375-376, 382-384, 398-400, 1863; Nordenskiöld, E., *Hist. of Biol.*, pp. 306-309, 1935.
- BLUTEL, Jean Pierre Esprit. (1782-1858). Buquet, L., *Ann. Soc. Ent. France*, (6) 905-911, 1858.
- BOAS, Johan Erik Vesti. (1855-1935). Henriksen, K. L., *P.*, *Ent. Meddel.*, 19: 186-190, 1935; Howard, L. O., *Hist. of Applied Ent.*, 1930.
- BOCK, George W. (1856-1940). Meiners, E. P., *Ent. News*, 52: 119, 1941.
- BODEMEYER, Bodo von. (1883-1929). Meissner, O., *Ent. Ztschr. (Frankfurt)*, 43: 255, 1930.
- BODEMEYER, Eduard von. ( -1918). Reitter, E., *Wiener Ent. Zeit.*, 37: 214, 1918.
- BOERHAAVE, Herman. (1668-1738). Nordenskiöld, Erik, *Hist. of Biol.*, pp. 183-186, 1935.
- BOHEMAN, Carl Heinrich. (1796-1868). Stal, C., *Ann. Soc. Ent. France* (4) 9: 105-106, 1869; Stal, C., *Stett. Ent. Zeit.*, 30: 35-38, 1869; Targioni-Tozzetti, A., *Bull. Soc. Ital.*, 2: 100-101, 1870; Dohrn, C. A., *Stett. Ent. Zeit.*, 32: 223-231, 1871; Musgrave, A., *B.*, *Bib. Austr. Ent.*, p. 27, 1932; Bates, H. W., *Trans. Ent. Soc. Lond. (Proc.)*: iv, 1868; Essig, E. O., *B.*, *P.*, *Hist. of Ent.*, pp. 558-559, 1931.
- BOIE, Friedrich. (1789-1870). Henriksen, K. L., *B.*, *P.*, *Ent. Meddel.*, 15: 191-193, 1925-26.
- BOISDUVAL, Jean Baptiste Alphonse Dechauffour de. (1799-1879). Fitch, E. A., *Entomologist*, 13: 119, 1880; *A.*, *Ent. Nachr.*, 6: 150, 1880; Capronnier, J. B., *Ann.*

- Soc. Ent. Belg., 23: (C. R.), p. xxxiii, 1880; Scudder, S. H., *Psyche*, 3: 71, 1880; Oberthür, C., *Ann. Soc. Ent. France*, (5) 10: 129-138, 1880; Girard, M. J. A., *Journ. Soc. Hort. France*, (3) 2: 422-426, 1880; Fauvel, A., *Annuaire Ent.*, pp. 118-119, 1880; A., *Ent. Mo. Mag.*, 16: 235-236, 1880; A., *Zool. Anzeiger*, 3: 144, 1880; A., B., *Naturaliste*, 2: 167, 1880; Musgrave, A., B., *Bib. Austr. Ent.*, pp. 27-28, 1932; Howard, L. O., P., *Hist. of Applied Ent.*, 1930; Essig, E. O., P., *Hist. of Ent.*, pp. 559-562, 1931.
- BOLD, Thomas John. (1816-1874). A., *Ent. Mo. Mag.*, 11: 20-21, 1874; Wright, J., B., *Trans. Northumberland & Durham Soc.*, 8: 33-46, 1884-89.
- BOLL, Ernest Friedrich. (1817-1868). Boll, F. C., *Arch. Ver. Fr. Nat. Mecklenb.*, 22: 1-34, 1869.
- BOLL, Jacob. (1828-1880). Geiser, S. W., *Southwest Review*, 14: 184-198, 1929; Geiser, S. W., P., *Amer. Mid. Nat.*, 11: 435-452, 1929; A., *Leopoldina*, 16: 193, 1880; Frey, H., *Stett. Ent. Zeit.*, 42: 143-146, 1881; A., *Ent. Mo. Mag.*, 17: 213-214, 1881; A., *Ent. Nachr.*, 7: 68, 1881; A., *Amer. Nat.*, 15: 84-85, 1881; Geiser, S. W., *Naturalists of the frontier*, pp. 11-37, 1937.
- BOLSTER, Percy Gardner. (1865-1932). Darlington, P. J., Jr., P., *Psyche*, 40: 87-88, 1933; Hungerford, H. B., *Ann. Ent. Soc. Amer.*, 26: 188, 1933.
- BOLTER, Andrew. (1820-1900). A., *Ent. News*, 11: 450, 1900.
- BOND, Frederick. (1811-1889). A., *Ent. Mo. Mag.*, 25: 384, 1889; Dunning, J. W., B., P., *Entomologist*, 22: 265-269, 1889; Balding, A., *Entomologist*, 23: 97-98, 1890.
- BONELLI, Franco Andrea. (1784-1830). Gené, G., *Mem. Acad. Sci. Torino*, 37: 126-151, 1834; Musgrave, A., *Bib. Austr. Ent.*, p. 28, 1932.
- BONHOURE, Alphonse. (1864-1909). Perrier, E., *Bull. Mus. Paris*, 15: 53, 1909; Gravier, C., *l. c.*, pp. 59-66, 1909.
- BONNET, Charles. (1720-1793). Miall, L. C., *Early Naturalists, their lives and work*, pp. 284-291, 1912; Swainson, W., *Bib. of Zool.*, p. 133, 1840; Nordenskiöld, Erik, P., *Hist. of Biol.*, pp. 243-247, 1935; Locy, W. A., *Story of Biol.*, pp. 265-266, 1925; Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, p. 249, 1823.
- BONVOULOIR, Henri Achard de. (1839-1914). Rabaud, E., B., *Bull. Soc. Ent. France*, pp. 405-407, 1914; A., *Ent. News*, 26: 191-192, 1915; A., *Miscellanea Ent.*, 22 (10): 50, 1915.
- BORCH, Ole. (See Borrichium, Olaus).
- BORDAGE, Edmond. ( - ). A., *Ent. News*, 35: 303-304, 1924; Picard, F., *Bull. Soc. Ent. France*, p. 33, 1924.
- BORG, Karl Anders Hjalmar. (1859-1910). A., P., *Ent. Tidskr.*, 37: 109, 1911.
- BORMANS, Auguste de. ( - ). "M. B.", P., *Ent. Record*, 13: 85-88, 1901.
- BORRICHUS, Olaus. (1626-1690). Henriksen, K. L., P., *Ent. Meddel.*, 15: 15-16, 1921.
- BORTHWICK, Thomas. (1860-1924). Musgrave, A., *Bib. Austr. Ent.*, p. 29, 1932.
- BOS, Jan Ritzema. (1850-1928). Howard, L. O., *Journ. Econ. Ent.* 21: 636-637, 1928; Poeteren, N. van, P., *Anzeiger f. Schädlingk.*, 4: 115, 1928; Howard, L. O., P., *Hist. of Applied Ent.*, 1930.
- BOSC D'ANTIC, Louis Augustin Guillaume. (1759-1828). Cuvier, G. C. L. D., B., *Mem. Mus. Hist. Nat. Paris*, 18: 69-92, 1829.
- BÖSENBERG, Friedrich Wilhelm. (1841-1903). A., *Leopoldina*, 39: 84, 1903.
- BOSWELL, John Thomas. (1822-1888). A., *Ent. Mo. Mag.*, 24: 235, 1888; Dimmock, G., *Psyche*, 5: 156, 1889.
- BOUCOMONT, Antoine. (1868-1936). A., *Arb. morph. taxon. Ent. Berlin-Dahlem*, 3: 300, 1936; A., *Koleopt. Rundschau*, 23: 56, 1937.
- BOUDIER, Emile. (1828-1920). A., *Ent. News*, 31: 210, 1920; Simon, E., *Ann. Soc. Ent. France*, 89: 376, 1920.
- BOULAY, Francis Houssemayne du. (1837-1914). Musgrave, A., *Bib. Austr. Ent.*, p. 72, 1932.
- BOULLET, Eugene. ( - 1923). A., *Ent. News*, 34: 256, 1923; Rabard, E., *Bull. Soc. Ent. France*, p. 49, 1923; Mangin, L., *Bull. Mus. Paris*, 29: 124, 1923.
- BOURGEOIS, Jules. (1846-1911). A., *Ent. News*, 23: 48, 1912; Morice, F. D., *Trans. Ent. Soc. Lond.* (Proc.), p. cxxvi, 1911; Janet, A., *Bull. Soc. Ent. France*, p.

- 277, 1911; Semenov-Tian-Shanskij, A., *Rev. Russe Ent.*, 12: 637, 1912; *A.*, *Miscellanea Ent.*, 19 (8): 84, 1911.
- BOWERBANK, James Scott. (1797-1877). *A.*, *Geol. Mag.*, 4: 191-192, 1877; Tyler, C., *Journ. R. Micro. Soc.*, 1: 28-30, 1878.
- BOWES, Anthony John Lee. (1913-1942). "C. G. M. de W.", *Ent. Record*, 55: 42, 1943.
- BOWLES, George J., (1837-1888?). *A.*, *Ann. Rpt. Ent. Soc. Ont.*, 18: 50-51, 1888; Goding, F. W., *Ann. Rpt. Ent. Soc. Ont.*, 20: 20-21, 1889.
- BOWRING, John Charles. (1821-1893). *A.*, *Ent. Mo. Mag.*, 29: 169, 1893.
- BOYCE, Robert William. (1864-1911). Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930.
- BOYD, William Christopher. ( -1907). *A.*, *Ent. Record*, 19: 28, 1907; Banks, E. R., *Ent. Mo. Mag.*, 43: 16, 1907; Waterhouse, C. O., *Trans. Ent. Soc. Lond.*, (Proc.), p. xcvi, 1907.
- BOYER DE FONSCOLOMBE, Etienne Laurent Joseph Hippolyte. (1772-1853). *Supporta*, M. de, *Ann. Soc. Ent. France*, (3) 1: (Bull.), xiii-xiv, 1853; Mulsant, E., *Ann. Soc. Lyon*, 1: 336, 1853.
- BRABANT, Edouard. (1849-1912). Chretien, P., *B.*, *P.*, *Ann. Soc. Ent. France*, 82: 785-789, 1913.
- BRADFORD, George Dexter. (1873-1894). *A.*, *Ent. News*, 6: 64, 1895; Beutenmüller, W., *Journ. N. Y. Ent. Soc.*, 2: 192, 1894.
- BRADLEY, John W. ( -1918). Burgess, A. F., *Journ. Econ. Ent.*, 11: 393, 1918.
- BRAKELEY, Jonah Turner. (1847-1915?). Dow, R. P., *Bull. Bklyn. Ent. Soc.*, 10: 84-86, 1915.
- BRAMSON, Constantin Ludwig. (1842-1909). Jacobson, G. G., *P.*, *Rev. Russe Ent.*, 9: 343-344, 1909.
- BRANCSIK, Karl. (1842-1915). *A.*, *Wien. Ent. Zeit.*, 35: 64, 1916; *A.*, *Ent. Blätter*, 13: 62, 1917; Hetschko, A., *B.*, *P.*, *Wien. Ent. Zeit.*, 49: 51-55, 1932; Soldanski, H., *Deutsche Ent. Ztschr.*, p. 88, 1916.
- BRANDT, Eduard Karlovic. (1839-1891). Porchinsky, I., *B.*, *P.*, *Horae Soc. Ent. Ross.*, 27: i-vi, 1893.
- BRANDT, Johann Friedrich. (1802-1879). Schalow, H., *Ornith. Zentralbl.*, 4: 125-127, 1879; *A.*, *Zool. Anzeiger*, 2: 480, 1879; Geinitz, H. B., *Leopoldina*, 16: 20-21, 1880; *A.*, *Naturaliste*, 1: 111, 1879.
- BRAUER, Friedrich Moritz. (1832-1904). *A.*, *Ent. Mo. Mag.*, 41: 73-74, 1905; *A.*, *Ent. News*, 16: 160, 1905; Poulton, E. B., *Trans. Ent. Soc. Lond.*, (Proc.), pp. c-ci, 1904; Handlirsch, A., *B.*, *P.*, *Verh. zool.-bot. Ges. Wien*, 55: 129-166, 1905; Handlirsch, A., *Deutsche Ent. Ztschr.*, 49: 173-174, 1905; Musgrave, A., *B.*, *Bib. Austr. Ent.*, p. 31, 1932; *A.*, *Leopoldina*, 41: 44-45, 1905; Grobben, K., *Bot. & Zool. in Oesterr. 1850-1900 Festschr.*, p. 502, 1901; Osten-Sacken, C. R., *Record of my life and work in entomology*, pp. 164-180, 1903; *A.*, *Wien. Ent. Zeit.*, 24: 56, 1905.
- BRAUNS, Hans Heinrich Justus Carl Ernst. (1857-1929). *A.*, *Ent. News*, 40: 204, 1929; *A.*, *Nature*, 123: 499-500, 1929.
- BREISSON, Jean Baptiste Gilles. ( - ). *A.*, *Ann. Soc. Ent. France*, 1: 114, 1832.
- BREHM, Alfred Edmund. (1829-1884). *A.*, *Psyche*, 4: 236, 1884; Koepart, *Der Naturforscher*, 5: 480-486, 1928-29.
- BREHM, Herman H. (1869-1924). Rummel, C., *Bull. Bklyn. Ent. Soc.*, 20: 96, 1925.
- BRENSKE, Ernst. (1845-1904). Auel, H., *Ent. Ztschr.*, (Frankfurt) 43: 113, 1929; *A.*, *Wiener Ent. Zeit.*, 23: 150, 1904; *A.*, *Leopoldina*, 40: 95, 1904; "A. C.", *Rev. Russe Ent.*, 4: 254, 1904.
- BRETHES, Juan. (1871-1928). Howard, L. O., *Ent. News*, 39: 328, 1928; Porter, C. E., *P.*, *Rev. Chilena Hist. Nat.*, 32: 341-344, 1928; Porter, C. E., *B.*, *P.*, *Rev. Chilena, Hist. Nat.*, 22: 5-15, 1918; Doello-Jurado, M., *B.*, *P.*, *Anal. Soc. Cient. Arg.*, 106: 73-79, 1928; Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930.
- BREYER, Adolfo. (1889-1936). Imms, A. D., *Proc. Roy. Ent. Soc. Lond.*, ser. C, 1 55, 1937.

- BRIGANTI, Vincenzo. (1766-1836). Costa, O. G., Trans. Ent. Soc. Lond., 4: (Append.), xviii, 1845-47.
- BRIGGS, Charles Adolphus. (1849-1916). *A.*, Ent. Mo. Mag., 52: 279-280, 1916; *A.*, Ent. News, 28: 337, 1917; Lucas, W. J., Entomologist, 50, 23-24, 1917.
- BRIGHT, Percy May. (1863-1941). "S. G. C. R.", Entomologist, 74: 144, 1941.
- BRINDLEY, Maud Doria Haviland. (1891-1941). Thorpe, W. H., Ent. Mo. Mag., 77: 136-137, 1941; Blair, K. G., Proc. Roy. Ent. Soc. Lond., (C) 6: 40, 1941-42.
- BRISCHKE, Carl Gustav A. (1814-1897). Conwentz, H. W., B., Schrift. Naturf. Ges. Danzig, 9: nos. 3-4, pp. 7-12, 1902; Speiser, P., Insekten-Börse, 19: 400-401, 1902.
- BRISOUT DE BARNEVILLE, Charles. (1822-1893). Bonvouloir, H. de, B., *P.*, Ann. Soc. Ent. France, 63: 439-448, 1894; Kraatz, G., Deutsche Ent. Zeitschr., 37: 5, 1893.
- BRITTON, Wilton Everett. (1868-1939). *A.*, Ent. News, 50: 90, 1939; O'Kane, W. C., Science, n. s., 89: 332-333, 1939; Felt, E. P., *P.*, Journ. Econ. Ent., 32: 350-351, 1939; Sachtleben, H., Arb. phys. angew. Ent. Berlin-Dahlem, 6: 209, 1939; *A.*, Indian Journ. Ent., 1: 128, 1939; Usinger, R. L., Pan-Pacific Ent., 16: 12, 1940; Mickel, C. E., Ann. Ent. Soc. Amer., 33: 216, 1940; Friend, R. B., *P.*, Conn. State Ent. 39th Rpt. (Bull. 434), pp. 215-221, 1940; Friend, R. B., *P.*, Conn. Geol. & N. H. Surv. Bull. 62, pp. 6-7, 1941; *A.*, Science, 92: 100-101, 1940; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., p. 219, 1937.
- BROCHER, Frank. (1866-1936). *A.*, Bull. Soc. Ent. France, 41: 17, 1936; Pictet, A., B., *P.*, Mitt. Schweiz. Ent. Ges., 16: 749-761, 1936.
- BRODIE, Peter Bellinger. (1815-1897). *A.*, Ent. Mo. Mag., 33: 283-284, 1897.
- BRODIE, William. (1831-1909). *A.*, Can. Ent., 42: 47-48, 1910; Morris, F., *P.*, Can. Ent., 41: 377-380, 1909; Morris, F., *P.*, Ann. Rpt. Ent. Soc. Ont., 40: 129, 1909.
- BROERSE, J. (1875-1940). Corporaal, J. B., Ent., Berichten, 10: 213-214, 1940.
- BRÖLEMANN, Henri. (1860-1933). "J. C.", Mitt. Schweiz. Ent. Ges., 16: 611, 1935; Duboscq, O., B., *P.*, Bull. Soc. Zool. France, 58: 275-283, 1933; Porter, C. E., Rev. Chilena Hist. Nat. Hist., 33: 314, 1934.
- BRONGNIART, Alexandre. (1770-1847). Dumas, J. B., B., Mem. Acad. Sci. France, 39: xxxvii-xcix, 1877.
- BRONN, Heinrich Georg. (1800-1862). *A.*, Amer. Journ. Sci., (2) 34: 304, 1862.
- BROOKS, Fred Ernest. (1868-1933). Cutright, C. R., Journ. Econ. Ent., 26: 742, 1933; Hungerford, H. B., Ann. Ent. Soc. Amer., 27: 121, 1934.
- BROUN, Thomas. (1838-1919). *A.*, Ent. News, 31: 149, 1920; Howard, L. O., *P.*, Hist. of Applied Ent., 1930; Walker, J. J., Trans. Ent. Soc. Lond., (Proc.): xc-xci, 1919.
- BROWN, Edwin. (1819-1876). *A.*, Ent. Mo. Mag., 13: 116-117, 1876; Musgrave, A., Bib. Austr. Ent., p. 32, 1932.
- BROWN, François Robert Fenwick. (1837-1915). Lambertie, M., B., Ann. Soc. Ent. France, 85: 188-196, 1916; Oberthür, C., *P.*, Études Léop. Comp., 11: unpagéd, 1916.
- BROWN, Jay Elmer. ( -1903). *A.*, Ent. News, 15: 56, 1940.
- BROWN, Thomas Nesmith. (1851-1929). Miller, R. C., *P.*, Ent. News, 41: 29-30, 1930.
- BROWNE, George B. (1851-1920). "A. L. R.", Entomologist, 54: 24, 1920.
- BRUAND D'UZELLE, Charles Théophile. (1808-1861). Millière, P., B., Ann. Soc. Ent. France, (4) 1: 651-656, 1861.
- BRUCH, Carlos. (1869-1943). Lizer y Trelles, C. A., et al., B., *P.*, Rev. Soc. Ent. Arg., 12: 71-91, 1943; Lizer y Trelles, C. A., B., Rev. Soc. Ent. Arg., 9: 13-25, 1937; Birabén, M., Rev. Soc. Ent. Arg., 12: 48-56, 1943; Mello Leitão, C. de, Rev. Ent. (Rio de J.), 14: 528-529, 1943.
- BRUGNATELLI, Gaspare. (1795-1852). Veladini, G., Giorn. R. Istit. Lombardo, 9: 489-490, 1856.
- BRULLÉ, Gaspard Auguste. (1809-1873). Desmarest, E., B., Ann. Soc. Ent. France, (5) 2: 513-516, 1872; Girard, M. J. A., Pet. Nouv. Ent., 4: 280-281, 1873; Fauvel, A., Annuaire Ent., 2: 120-121, 1874; Marchant, L., B., Mem. Acad. Sci. Dijon (Part. Sci.) pp. 37-42, 1874.

- BRUNER, Lawrence. (1856-1937). *A.*, Ent. News, 48: 83, 1937; Barber, H. G., et al., *P.*, Proc. Ent. Soc. Wash., 39: 59-60, 1937; Van Duzee, E. P., Pan-Pacific Ent., 13: 68, 1937; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 161, 1937; Mickel, C. E., Ann. Ent. Soc. Amer., 31: 119, 1938; Swenk, M. H., *P.*, Nebraska Bird Review, 5: 35-48, 1937; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., pp. 219-220, 1937; Liebermann, J., Rev. Soc. Ent. Arg., 12: 222-226, 1944.
- BRUNETTI, Enrico Adelelmo. (1864-1927). Kemp, S. W., Ent. Mo. Mag., 63: 236-237, 1927; *A.*, Ent. News, 39: 295, 1928; "R. S.-W.", *B.*, Rec. Indian Mus., 29: 287-296, 1927; *A.*, Entomologist, 60, 142-143, 1927; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 33-34, 1932; Collin, J. E., Proc. Ent. Soc. Lond., 2: 106, 1927.
- BRÜNNICH, Martin Thran. (1737-1827). Henriksen, K. L., *P.*, Ent. Meddel., 15: 41-47, 1921; Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., p. 254, 1823.
- BRUYANT, Charles. (1869-1916). Berland, L., *B.*, Ann. Soc. Ent. France, 89: 420-421, 1920.
- BUCKHOUT, William Armstrong. (1846-1912). *A.*, Ent. News, 24: 48, 1912.
- BÜCKING, Hermann. (1855-1928). Ochs, G., *P.*, Ent. Blätter, 24: 97-98, 1928.
- BUCKLAND, William. (1784-1856). Buckland, F. T., *B.*, *P.*, Buckland's Geol. & Mineral., 1: xix-lxxxiii, 1858.
- BUCKLER, William. (1814-1884). Hellins, J., Ent. Mo. Mag., 20: 229-236, 1884; Lefèvre, E., Ann. Soc. Ent. France, (6) 4: (Bull.) p. xiv, 1884.
- BUCKLEY, Samuel Botsford. (1809-1883). Geiser, S. W., Southwest Review, 16: 133-134, 1930; Geiser, S. W., Field & Lab., 4: 45, 1936.
- BUCKTON, George Bowdler. (1818-1905). Fowler, W. W., Ent. Mo. Mag., 41: 282, 1905; *A.*, Trans. Ent. Soc. Lond., (Proc.), pp. lxxxvi-lxxxvii, 1905 (1906); Musgrave, A., Bib. Austr. Ent., p. 34, 1932; Kirby, W. F., *B.*, Nature, 72: 587-588, 1905.
- BUFFON, Georges Louis Leclerc de. (1707-1788). Nordenskiöld, Erik, *P.*, Hist. of Biol., pp. 219-229, 1935.
- BUGNION, Charles Juste Jean Marie. (1811-1897). Bugnion, E., *P.*, Ann. Soc. Ent. France, 66: 317-318, 1897; *A.*, Leopoldina, 33: 112, 1897.
- BUGNION, Frederic Edouard. (1845-1939). Carl, J., Mitt. Schweiz. Ent. Ges., 17: 616-617, 1939; Schulthess, A. de, *P.*, Mitt. Schweiz. Ent. Ges., 16: 395-398, 1935.
- BUNKER, Robert. (1821-1892). *A.*, Ent. News, 3: 104, 1892.
- BUQUET, Jean Baptiste Lucien. (1807-1899). Leprieux, C. E., *B.*, Ann. Soc. Ent. France, (6) 10: 429-434, 1890; "F.", Krancher's Ent. Jahrb., p. 195, 1892; *A.*, Abeille, 27: clxvii-clxviii, 1890-92.
- BURCHELL, William John. (1782-1863). Ihering, H. von, Rev. Mus. Paulista, 8: 482-484.
- BURDETTE, Robert Carlton. (1898-1935). Headlee, T. J., Journ. Econ. Ent., 28: 252-253, 1935.
- BURGER, Owen Francis. (1885-1928). Weber, G. F., *P.*, Mo. Bull. State Plant Bd. Fla., 12: 158-162, 1928.
- BURGESS, Edward. (1848-1891). *A.*, Ent. News, 2: 168, 1891; *A.*, Insect life, 3: 490, 1891; *A.*, Psyche, 6: 131, 1891; Scudder, S. H., *B.*, Proc. Bost. Soc. N. H., 25: 358-365, 1892; Walton, W. R., Proc. Ent. Soc. Wash., 23: 90-91, 1921; Osborn, H., Fragments Ent. Hist., p. 207, 1937.
- BURMEISTER, Herman Carl Conrad. (1807-1892). *A.*, Ent. News, 3: 191-192, 1892; *A.*, Psyche, 6: 300, 1892; Berg, C., *B.*, *P.*, Ann. Soc. Ent. France, 63: 705-712, 1894; Godman, F. D., Trans. Ent. Soc. Lond., (Proc.), pp. xlvi-xlvii, 1892; McLachlan, R., Ent. Mo. Mag., 28: 221-222, 1892; Berg, C., *B.*, *P.*, Anal. Mus. Buenos Aires, 4: 315-357, 1895; *A.*, Ent. Nachr., 18: 220-222, 1892; Balestra, Anal. Soc. Cient. Argent. 33: 145-150, 1892; Musgrave, A., Bib. Austr. Ent., p. 34, 1932; Lefèvre, E., Ann. Soc. Ent. France, 61 (Bull.): cxxix, 1892; *A.*, *P.*, Physis, 3: 305-306, 1917; *A.*, Insect Life, 5: 211, 1893; Howard, L. O., *P.*, Hist. of Applied Ent., 1930; Essig, E. O., *B.*, *P.*, Hist. of Ent., pp. 562-563, 1931; Osborn, H., *P.*, Fragments Ent. Hist., 1937; Cardoso, A., *P.*, Rev. Soc. Ent. Arg., 12: 159-165, 1944.



- BURNETT, Waldo Irvin. (1828-1854). Wyman, J., *Proc. Bost. Soc. N. H.*, 5: 64-74, 1854.
- BURNEY, Henry. (1813-1893). *A.*, *Ent. Mo. Mag.*, 29: 196, 1893.
- BURROWS, Charles Rich Nelson. (1851-1936). Bainbrigg-Fletcher, T., *P.*, *Ent. Record*, 49: 22-24, 1937; "F. N. P.", *Entomologist*, 70: 23-24, 1937; *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 4: 160, 1937; Imms, A. D., *Proc. Roy. Ent. Soc. Lond.*, ser. C, 1: 55, 1927.
- BUTLER, Arthur Gardiner. (1844-1925). *A.*, *Ent. News*, 36: 256, 1925; Riley, N. D., *Entomologist*, 58: 175-176, 1925; Walker, J. J., *Ent. Mo. Mag.*, 61: 167, 1925; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 36-37, 1932; Pocock, R. I., *Proc. Linn. Soc. Lond.*, pp. 75-76, 1925-26.
- BUTLER, Charles. (1560-1647). Miall, L. C., *Early Naturalists, their lives and work*, pp. 87-93, 1912.
- BUTLER, Edward Albert (1845-1925). *A.*, *Entomologist*, 59: 24, 1926; *A.*, *Ent. News*, 37: 126, 1926; China, W. E., *P.*, *Ent. Mo. Mag.*, 62: 24, 1926.
- BUTTERFIELD, Roscoe. (1875-1939). *A.*, *Ent. Mo. Mag.*, 75: 19, 1939.
- BUYSSON, Henri du. ( ). *A.*, *Ent. News*, 39: 296, 1928; Roubaud, E., *Bull. Soc. Ent. France*, pp. 217-218, 1927.
- CALDER, Edwin Eddy. (1853-1929). *A.*, *Ent. News*, 40: 99-100, 1929.
- CAMERARIUS, Rudolph Jacob. (1665-1721). Nordenskiöld, Erik, *Hist. of Biol.*, pp. 197-198, 1925; Locy, W. A., *P.*, *Story of Biol.*, pp. 410-411, 1925.
- CAMERON, Peter. (1847-1912). *A.*, *Ent. News*, 24: 96, 1913; "G. M. W.", *Ent. Mo. Mag.*, 49: 20-21, 1913; Morice, F. D., *Trans. Ent. Soc. Lond.*, (Proc.), p. clxix, 1912; Morley, C., *Entomologist*, 46: 24, 1913.
- CAMPION, Herbert. (1870-1924). *A.*, *Ent. Mo. Mag.*, 60: 69, 1924; *A.*, *Ent. News*, 35: 190, 1924; Gahan, C. J., *Entomologist*, 57: 72, 1924; Calvert, P. P., *Ent. News*, 35: 265-266, 1924; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 39-40, 1932.
- CAMPOS, Francisco. (1878- ). *A.*, *Journ. Econ. Ent.*, 36: 247, 1943; Campos, F., *B.*, only. (Sep.), 6 pp., Guayaquil, 1929; Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930.
- CANDEZE, Ernest Charles Auguste. (1827-1898). *A.*, *Ent. News*, 9: 208, 1898; La-meere, A., *B.*, *P.*, *Ann. Soc. Ent. Belg.*, 42: 504-519, 1898; Longchamps, S., *B.*, *P.*, *Ann. Acad. Roy. Belg.*, 66: 419, 1900; McLachlan, R., *Ent. Mo. Mag.*, 34: 215-216, 1898; Trimen, R., *Trans. Ent. Soc. Lond.*, (Proc.), p. liii, 1898; *A.*, *Deutsche Ent. Ztschr.*, 42: 8, 1898; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 39-40, 1932; Essig, E. O., *P.*, *Hist. of Ent.*, pp. 563-564, 1931.
- CANESTRINI, Giovanni. (1835-1900). Grobben, K., *Bot. & Zool. in Oesterr. 1850-1900 Festschr.*, p. 531, 1901; *A.*, *Zool. Anzeiger*, 23: 136, 1900.
- CANT, Arthur. (1863-1924). *A.*, *Ent. News*, 36: 222, 1925; Riley, N. D., *Entomologist*, 58: 72, 1925.
- CANTIMPRÉ, Thomas de. ( -ca. 1279). Locy, W. A., *Story of Biol.*, p. 102, 1925.
- CAPOMONT, Guillaume. (1812-1871). Kraatz, G., *Berl. Ent. Ztschr.*, 15: ix, 1871; Bonnaire, A., *Ann. Soc. Ent. France*, (5) 1: 463-467, 1872; *A.*, *Pet. Nouv. Ent.*, 3: 169, 1871; Newman, E., *Entomologist*, 6: 32, 1872.
- CARCEL, Pierre. (1800-1831). *A.*, *Ann. Soc. Ent. France*, 1: 113-114, 1832.
- CARPENTER, George Herbert. (1865-1939). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 6: 188, 1939; Sachtleben, H., *Arb. phys. angew. Ent. Berlin-Dahlem*, 6: 209, 1939; *A.*, *Indian Journ. Ent.*, 1: 128, 1939; *A.*, *The Museums Journ. (Lond.)*, 38: 586, 1939.
- CARPENTIER, Léon. (1838-1914). *A.*, *Miscellanea Ent.*, 22 (12): 66-67, 1915.
- CARR, Frederick Stephen. (1882-1934). "H. A. M.", *Can. Ent.*, 66: 211-212, 1934; *A.*, *Ent. News*, 45: 202, 1934; *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 1: 309, 1934.
- CARR, John Wesley. (1862-1939). Leivers, A. R., *Entomologist*, 72: 248, 1939.
- CARRINGTON, John Thomas. (1846-1908). Horn, W., *Deutsche Ent. Ztschr.*, p. 428, 1908; Briggs, C. A., *Entomologist*, 41: 73-74, 1908; *A.*, *Ent. Record*, 20: 123-124, 1908; Schaufuss, C., *Insektenbörse*, 25: 121, 1908.

- CARROLL, James. (1854-1907). *A.*, Brit. Med. Journ., 2: 1107-1108, 1907; *A.*, Ent. News, 18: 450, 1907; "G. M. S.", Science, 26: 453, 1907; Kelley, H. A., et al., Bull. Johns Hopkins Hosp., 19: 1-12, 1908; Kelley, H. A., Proc. Wash. Acad. Sci., 10: 204-207, 1908; Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- CARSTANJEN, Ernst. (1835-1884). *A.*, Psyche, 4: 236, 1884.
- CARTER, Henry Rose. (1852-1925). Howard, L. O., *P.*, Hist. Applied Ent., p. 481, 1930; Musgrave, A., Bib. Austr. Ent., p. 40, 1932; *A.*, Who's Who in America, 12: 634, 1922-23.
- CARTER, Herbert James. (1858-1940). Blair, K. G., Ent. Mo. Mag., 76: 159, 1940; Musgrave, A., Bib. Austr. Ent., pp. 40-42, 1932; McKeown, K. C., Austr. Mus. Mag., 7: 167-168, 1940; Anderson, R. H., Proc. Linn. Soc. N. S. Wales, 66: ii, 1941.
- CARTER, John William. (1843-1920). *A.*, Ent. News, 32: 192, 1921; Porritt, G. T., Ent. Mo. Mag., 57: 65-68, 1921.
- CARUS, Carl Gustav. (1789-1869). *A.*, *B.*, Proc. Linn. Soc. Lond., pp. 98-99, 1869-70; *A.*, Leopoldina, 7: 1-6, 33-36, 1871; Walther, J., et al., *B.*, *P.*, Leopoldina, 3: 113-145, 1928; Nordenskiöld, Erik, Hist. of Biol., p. 290, 1935; Halm, K., Sitzber. Bayr. Akad. Wiss. München, 1: 412-415, 1870.
- CARUS, Julius Victor. (1823-1903). Taschenberg, O., *B.*, Leopoldina, 39: 50-64, 66-73, 1903; *A.*, Wien. Ent. Zeit., 22: 108, 1903; Kraatz, G., Deutsche Ent. Ztschr., 47: 8, 1903.
- CASEY, Thomas Lincoln. (1857-1925). Blaisdell, F. E., Pan-Pacific Ent., 2: 90-91, 1925; Grinnell, F., Bull. Bklyn. Ent. Soc., 9: 72, 1914; Hatch, M. H., *B.*, Ent. News, 37: 175-179, 198-202, 1926; Leng, C. W., Ent. News, 36: 97-100, 1925; Leng, C. W., Nat. Hist., 25: 206-207, 1925; Schwarz, E. A., et al., *P.*, Proc. Ent. Soc. Wash., 27: 41-43, 1925; Buchanan, L. L., *B.*, *P.*, Smith. Misc. Coll., 94 (3): 1-15, 1935; Essig, E. O., *P.*, Hist. of Ent., pp. 565-567, 1931; Osborn, H., *P.*, Fragments Ent. Hist., pp. 175-176, 1937.
- CASSIN, John. (1813-1869). *A.*, Amer. Journ. Sci., (2) 47: 291-293, 1869; Brewer, F. M., Proc. Bost. Soc. N. H., 12: 244-248, 1869.
- CASSINO, Samuel. (1854-1937). Estate of Cassino, Ent. News, 49: 180, 1938; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 5: 352, 1938.
- CASTLE, David Macfarland. (1842-1924). *A.*, Ent. News, 35: 304, 1924; Wenzel, H. W., *P.*, Ent. News, 35: 305-306, 1924.
- CASTELNAU, François Louis Nompard de Caumont de Laporte de. (1810-1880). *A.*, Amer. Nat., 14: 548-549, 1880; *A.*, Naturaliste, 2 (26): pp. 207-208, 1880; *A.*, Nature, 21: 500, 1880; *A.*, Zool. Anzeiger, 3: 168, 1880; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 186-187, 1932; Augé, C., Nouv. Larousse Illustr. Dict. Univ. Encycl., 2: 553-554, not dated, complete edition 1898-1906.
- CATESBY, Mark. (1679-1749). Strecker, H., *B.*, Butterflies and Moths of N. A., pp. 217-218, 1878; Walton, W. R., Proc. Ent. Soc. Wash., 23: 77-78, 1921.
- CAUCHY, Pierre Amédée. (1806-1831). *A.*, Ann., Soc. Ent. France, 1: 114, 1832.
- CAUDELL, Andrew Nelson. (1872-1936). Howard, L. O., et al., *B.*, *P.*, Proc. Ent. Soc. Wash., 38: 34-47, 1936; Ewing, H. E., *P.*, Journ. Econ. Ent., 29: 471-472, 1936; *A.*, Ent. News, 47: 112, 1936; Mickel, C. E., Ann. Ent. Soc. Amer., 30: 181-182, 1937; Musgrave, A., *B.*, Bib. Austr. Ent., p. 43, 1932; Wade, J. S., Proc. Ent. Soc. Wash., 38: 109, 1936; *A.*, Journ. Wash. Acad. Sci., 26: 222, 1936; Osborn, H., *P.*, Fragments Ent. Hist., p. 238, 1937.
- CAULFIELD, F. B. ( -1892). *A.*, Can. Ent., 24: 104, 1892.
- CELLI, Angelo. (1857-1914). Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- CERUTTI, Nestor. (1886-1940). Kutter, H., Mitt. Schweiz. Ent. Ges., 18: 208, 1940.
- CHABRIER, J. de Montpellier. ( - ). Swainson, W., Bib. of Zool., p. 151, 1840.
- CHAGAS, Carlos Justiniano Ribiero dos. (1879-1934). Villela, E., *B.*, *P.*, Mem. Inst. Oswaldo Cruz, 29: i-xxiii, 1934; *A.*, Pan-Amer. Union, 69: 150-151, 1934.
- CHAMBERS, Victor Toucey. (1831-1883). *A.*, Ann. Rpt. Ent. Soc. Ont., 14: 81, 1883; *A.*, Can. Ent., 15: 178, 1883; *A.*, Papilio, 3: 168, 1883.
- CHAMPION, George Charles. (1851-1927). *A.*, Entomologist, 60: 215-216, 1927; Cal-



- vert, R. P., *Ent. News*, 38: 296, 326-328, 1927; Turner, H. J., *Ent. Record*, 39: 131, 1927; Walker, J. J., *Nature*, 120: 415, 1927; Walker, J. J., et al., *P., Ent. Mo. Mag.*, 63: 197-203, 1927; Walker, J. J., *Proc. Linn. Soc. Lond.*, pp. 111-112, 1927-28; Collin, J. E., *Proc. Ent. Soc. Lond.*, 2: 103, 1927; Osborn, H., *Fragments Ent. Hist.*, p. 146, 1937.
- CHAMPION, Reginald James. (1895-1917). *A., Ent. News*, 29: 80, 1918; Walker, J. J., *Ent. Mo. Mag.*, 53: 215, 1917.
- CHAPMAN, Royal Norton. (1889-1939). Mickel, C. E., *Ann. Ent. Soc. Amer.*, 33: 216-217, 1940; *A., Ent. News*, 51: 3, 1940; Usinger, R. L., *Pan-Pacific Ent.*, 16: 12, 1940; *A., Science*, 90: 558, 1939; Graham, S. A., *P., Ann. Ent. Soc. Amer.*, 34: 521-524, 1941; Chapman, R. N., *Science*, 94: 81-82, 1941; Osborn, H., *P., Fragments Ent. Hist.*, p. 255, 1937.
- CHAPMAN, Thomas. (1816-1879). *A., Ent. Mo. Mag.*, 16: 138, 1879; *A., Zool. Anzeiger*, 2: 600, 1879.
- CHAPMAN, Thomas Algernon. (1842-1921). *A., Ent. News*, 33: 127-128, 1922; Champion, G. C., *P., Ent. Mo. Mag.*, 58: 40-41, 1922; Sheldon, N. G., *Entomologist*, 55: 44-48, 1922; Turner, H. J., *Ent. Record*, 34: 58-60, 1922; Musgrave, A., *Bib. Austr. Ent.*, p. 44, 1932; Rothschild, L. W., *Trans. Ent. Soc. Lond.*, (Proc.): cxxx-cxxxi, 1921; Oberthür, C. P., *Études Lép. Comp.*, 10 (plates): unpag., 1915.
- CHAPPELL, Joseph. (1830-1896). *A., Trans. Ent. Soc. Lond. (Proc.)*, p. xcv, 1896.
- CHAPUIS, Felicien. (1824-1879). Candèze, E., *Ent. Mo. Mag.*, 16: 139, 1879; Candèze, E., *Ann. Ent. Soc. Belg.*, 22(C. R.): cxxiii-cxxvii, 1879; *A., Naturaliste*, 1: 111, 1879; *A., Zool. Anzeiger*, 2: 600, 1879; Kraatz, G., *Deutsche Ent. Ztschr.*, 23: 434, 1879; Musgrave, A., *Bib. Austr. Ent.* p. 45, 1932.
- CHARDINY, Louis Curtius. (1793-1837). Donzel, H. F., *Ann. Soc. Ent. France*, 6 (Bull.): xxvi-xxx, 1837.
- CHARLON, Augustin. (1793-1842). Donzel, H. F., *Ann. Soc. Ent. France*, 11 (Bull.): xxviii-xxix, 1842.
- CHATANAY, Jean. (1884-1914). Berland, L., *P., Ann. Soc. Ent. France*, 89: 423-425, 1920; Alluaud, C., *Bull. Soc. Ent. France*, p. 457, 1914; *A., Science*, n. s. 41: 164, 1915.
- CHATFIELD, Alfred F. (1816-1900). *A., Ent. News*, 11: 451, 1900.
- CHAUDOIR, Maximilien de. (1816-1881). Sallé, A., *B., Ann. Soc. Ent. France*, (6) 1: 181-188, 1881; *A., Ent. Mo. Mag.*, 18: 43-45, 1881; Musgrave, A., *Bib. Austr. Ent.*, pp. 45-46, 1932.
- CHAVANNES, August. ( -1879). *A., Zool. Anzeiger*, 2: 528, 1879.
- CHENU, Jean Charles. (1808-1879). *A., Naturaliste* 2: 159, 1880; *A., Nat. Can.*, 12: 60-61, 1880; *A., Zool. Anzeiger*, 3: 144, 1880.
- CHEUX, Albert. ( -1914). *A., Bull. Soc. Ent. France*, p. 457, 1914; *A., Ent. News*, 26: 192, 1915; *A., Miscellanea Ent.*, 22 (10): 50, 1915.
- CHEVROLAT, Louis Alexandre Auguste. (1799-1884). *A., Psyche*, 4: 236, 1884; Dunning, J. W., *Trans. Ent. Soc. Lond.*, (Proc.): xliii, 1884; Reiche, M. L., *Ann. Soc. Ent. France*, (6) 4: 357-360, 1884; Musgrave, A., *B., Bib. Austr. Ent.*, pp. 46-47, 1932; *A., Naturaliste*, 7 (1): 15, 1885; Mik, J., et al., *Wien. Ent. Zeit.*, 4: 96, 1885; Lefèvre, E., *Ann. Soc. Ent. France* (6) 4 (Bull.): clvi-clvii, 1884.
- CHILDREN, John George. (1777-1852). Westwood, J. O., *Trans. Ent. Soc. Lond.*, (2) 1 (Proc.): 136-137, 1852; *A., Cent. Hist. Ent. Soc. Lond.*, pp. 119-120, 1933.
- CHITTENDEN, Frank Hurlburt. (1858-1929). Howard, L. O., *P., Journ. Econ. Ent.*, 22: 989-990, 1929; *A., U. S. Dept. Agr. Official Record*, 8 (39): 4, 1929; *A., Ent. News*, 41: 64, 1930; Wade, J. S., *Proc. Ent. Soc. Wash.*, 38: 109-110, 1936; Howard, L. O., *P., Hist. Applied Ent.*, 1930; Osborn, H., *P., Fragments Ent. Hist.*, pp. 190-191, 1937.
- CHITTY, Arthur John. (1859-1908). *A., Ent. Record*, 20: 45-47, 1908; *A., Entomologist*, 41: 48, 1908; Saunders, E., *Ent. Mo. Mag.*, 44: 43-45, 1908; Horn, W., *Deutsche Ent. Ztschr.*, p. 428, 1908; Waterhouse, C. O., *Trans. Ent. Soc. Lond.*, (Proc.): xcvi, 1907.
- CHOBOUT, Alfred. (1860-1926). Fagnier, C., *B., P., Ann. Soc. Ent. France*, 95: 195-208, 1926.

- CHOLODKOVSKY, Nicholas Alexander. (1858-1921). Howard, L. O., *P.*, Hist. Applied Ent., pp. 292, 295, 296, 300, 303, 307, 536, 1930; *A.*, *B.*, only, Rev. Russe Ent., 17: lxxx-xc, 1921; Pavlovsky, E. N., *P.*, Parasitology, 17: 401-402, 1925.
- CHRISTOPH, Hugo Theodor. (1831-1894). Hernig, E., *B.*, Stett. Ent. Zeit., 55: 133-139, 1894; *A.*, Ent. Mo. Mag., 31: 30, 1895; *A.*, Leopoldina, 31: 54, 1895; Sievers, G., Iris, 7: 361-363, 1894.
- CHRISTY, Robert Miller. (1861-1928). "P. T.", Proc. Linn. Soc. Lond., pp. 112-113, 1927-28.
- CHRISTY, William Miller. (1863-1939). Edelsten, H. M., Entomologist, 73: 24, 1940.
- CHUN, Carl. (1852-1914). *A.*, Ent. News, 25: 335, 1914; Winter, F. W., *P.*, Ber. Senckenberg. Naturf. Ges., 45: 176-183, 1914.
- CHYZER, Kornelius. (1836-1909). Csiki, E., *B.*, *P.*, Rovart. Lapok (Hung.), 17: 129-135, 143, 1910.
- CIRILLO, Dominique. (1734-1799). Costa, O. G., Trans. Ent. Soc. Lond., 4 (Proc.): xvii, 1845.
- CLAASEN, Peter Walter. (1886-1937). Phillips, E. F., *P.*, Journ. Econ. Ent., 30: 807-808, 1937; *A.*, Can. Ent., 69: 277, 1937; Imms, A. D., Ent. Mo. Mag., 73: 237, 1937; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 352, 1937; Mickel, C. E., Ann. Ent. Soc. Amer., 31: 119-120, 1938; Osborn, H., *P.*, Fragments Ent. Hist., p. 255, 1937.
- CLAIRVILLE, Joseph Philippe de. (1742-1830). Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., p. 262, 1823.
- CLARK, Alexander Henry. (1837-1911). Morice, F. D., Trans. Ent. Soc. Lond. (Proc.): cxxiii, 1911.
- CLARK, Benjamin Preston. (1860-1939). Rehn, J. A. G., Ent. News, 50: 90, 1939; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 6: 188, 1939.
- CLARK, Bracy. (1771-1860). *A.*, Proc. Linn. Soc. Lond., pp. xxi-xxiv, 1861.
- CLARK, Hamlet. (1823-1867). Newman, E., Entomologist, 3: 304-i-304-ii, 1867; Newman, E., Ent. Mo. Mag., 4: 43-44, 1867; *A.*, Zoologist, (2) 2: 840, 1867; *A.*, Proc. Linn. Soc. Lond., pp. c-ci, 1867; Musgrave, A., Bib. Austr. Ent., p. 48, 1932.
- CLARK, John Adolphus. (1842-1908). Bell, S. J., *P.*, Trans. City of Lond. Ent. & N. H. Soc., 18: 64-66, 1908.
- CLARKE, Cora Huidekoper. (1851-1916). *A.*, Psyche, 23: 94, 1916; *A.*, Ent. News, 27: 384, 1916.
- CLARKE, Warren Thompson. (1863-1929). Essig, E. O., *P.*, Journ. Econ. Ent., 22: 608-609, 1929; Essig, E. P., *P.*, Hist. of Ent., pp. 568-570, 1931.
- CLECHORN, Hugh Francis Clarke. ((1820-1895). *A.*, Journ. Botany (Lond.), 33: 256, 1895.
- CLEMENS, James Brackenridge. (1829-1867). *A.*, Ent. Mo. Mag., 4: 21, 1867; Skinner, H., *P.*, Ent. News, 25: 289-292, 1914; Smith, J. B., *P.*, Pop. Sci. Mo., 76: 472, 1910; *A.*, Practical Ent., 2: 58, 1867; Osborn, H., *P.*, Fragments Ent. Hist., p. 141, 1937.
- CLEMENT, Aimand Lucien. (1848-1920). Iches, L., Ann. Soc. Ent. France, 90: 66-68, 1921.
- CLEMENTI, Vincent. (1812-1899). *A.*, Can. Ent., 31: 371, 1889; Bethune, C. J. S., Ann. Rpt. Ent. Soc. Ont., 30: 124, 1899.
- CLERCK, Carl Alexander. (1710-1765). Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., p. 252, 1823.
- CLOUËT DES PEBRUCHES, Louis. ( -1911). Rev. Russe Ent., 12: 637, 1912; Gaulle, J. de, Bull. Soc. Ent. France, p. 341, 1911.
- COLBEAU, Jules Alexandre Josef. (1823-1881). *A.*, Leopoldina, 17: 101, 1881.
- COLEMAN, George Albert. (1866-1932). Essig, E. O., *P.*, Mo. Bull. Dept. Agr. Calif., 21: 246-247, 1932.
- COLIN, Gabriel Constant. (1825-1896). *A.*, Archiv Patol. Anat. & Phys. (Berlin), 148: 191, 1897.
- COLLEDGE, William Robert. (1841-1928). *A.*, *B.*, *P.*, Queensland Nat., 6: 93-94, 1928.

- COLLETT, Edward Pyemont. (1863-1937). Britten, H., *Ent. Mo. Mag.*, 73: 92, 1937; *A., Arb. morph. taxon. Ent. Berlin-Dahlem*, 4: 241, 1937.
- COLLINS, Joseph Joynson. (1865-1942). "A. H. H.", et al., *North Western Nat.*, 17: 113-114, 1942.
- COLLINSON, Peter. (1695-1768). Fée, A. L. A., *Mem. Soc. Sci. Lille*, 1: 142-148, 1831 (1832).
- COMPÈRE, George. (1858-1928). Essig, E. O., *P., Hist. of Ent.*, pp. 574-575, 1931.
- COMSTOCK, Anna Botsford. (1854-1930). *A., P.* (nr. p. 97), *Ent. News*, 41: 277-279, 1930; Herrick, G. W., *P., Journ. Econ. Ent.*, 23: 889-890, 1930; Munson, O., *P., Nature Mag.*, 33: 50-52, 1940; Essig, E. O., *P., Hist. of Ent.*, p. 577, 1931; Osborn, H., *P., Fragments Ent. Hist.*, p. 178, 1937.
- COMSTOCK, John Henry. (1849-1931). Finch, C., et al., *Ent. News*, 42: 155-157, 1931; Herrick, G. W., *P., Ann. Ent. Soc. Amer.*, 24: 199-204, 1931; Herrick, G. W., *P., Journ. Econ. Ent.*, 24: 564-566, 1931; Davis, J. J., *Ann. Ent. Soc. Amer.*, 25: 249-250, 1932; Riley, W. A., *Lingnan Sci. Journ.*, 10: 331-333, 1931; Howard, L. O., *Ann. Rpt. Smithsn. Inst.*, pp. 389-390, 1930; Eltringham, H., *Proc. Ent. Soc. Lond.*, 6: 106, 1932; Needham, J. G., *Science*, 73: 409-410, 1931; Howard, L. O., *P., Hist. Applied Ent.*, 1930; Essig, E. O., *B., P., Hist. of Ent.*, pp. 575-578, 1931; Osborn, H., *P., Fragments Ent. Hist.*, pp. 177-178, 1937.
- CONRADI, Adolph. (1838-1910). *A., Ent. News*, 21: 436, 1910; Osborn, H., *P., Fragments Ent. Hist.*, 1937.
- CONSTANT, Alexandre. (1829-1901). Lafaury, C., *B., P., Ann. Soc. Ent. France*, 70: 8-17, 1901; McLachlan, R., *Ent. Mo. Mag.*, 37: 173-174, 1901; Walker, J. C., *Entomologist*, 34: 212, 1901.
- COOK, Albert John. (1842-1916). *A., Ent. News*, 27: 432, 1916; *A., P., Mo. Bull. St. Hort. Comm.*, 5: 355, 1916; Goding, F. W., *Mich. Hort. Rpt.*, 18: 338-339, 1888; Howard, L. O., *P., Hist. Applied Ent.*, 1930; Essig, E. O., *P., Hist. of Ent.*, pp. 578-581, 1931; Osborn, H., *P., Fragments Ent. Hist.*, pp. 224-225, 1937.
- COOK, Edwin W. (1904-1941). *A., U. S. Dept. Agr. Bur. Ent. & Plant Quar. News Letter*, 8 (12): 2-3, 1941.
- COOK, Frank Cummings. ( -1923). Bishopp, F. C., *Journ. Econ. Ent.*, 16: 398-399, 1923.
- COOK, James. (1728-1779). Musgrave, A., *B., Bib. Austr. Ent.*, pp. 53-54, 1932.
- COOKE, Benjamin. (1816-1883). Dunning, J. W., *Trans. Ent. Soc. Lond.*, (Proc.): xli-xlii, 1883; *A., Wien. Ent. Zeit.*, 2: 184, 1883.
- COOKE, Caleb. (1838-1880). *A., Amer. Nat.*, 14: 614, 1880.
- COOKE, Matthew. (1829-1887). Goding, F. W., *P., West. Am. Sci.*, 7: 27-29, 1890; Essig, E. O., *P., Hist. of Ent.*, pp. 581-584, 1931.
- COOKE, Nicholas. (1818-1885). *A., Ent. Mo. Mag.*, 22: 46, 1885; Dimmock, G., *Psyche*, 5: 35, 1888; Ellis, J. W., *Proc. Lit. & Philos. Soc. Liverpool*, 42: 97-102, 1888.
- COOPER, Abraham. (1829-1911). Bates, H. W., *Trans. Ent. Soc. Lond. (Proc.)*: lvi, 1868.
- COOPER, Ellwood. (1829-1918). Essig, E. O., *P., Hist. of Ent.*, pp. 585-587, 1931.
- COPE, Edward Drinker. (1840-1897). Frazer, P., *P., Amer. Nat.*, 31: 410-413, 1897; Gill, T. P., *Amer. Nat.*, 31: 831-863, 1897; Kingsley, J. S., *Amer. Nat.*, 31: 414-419, 1897; Osten Sacken, C. R., *Psyche*, 8: 75, 1897; *A., Leopoldina*, 33: 91, 1897.
- COQUEBERT, Antoine Jean. (1753-1825). Swainson, W., *Bib. of Zool.*, p. 154, 1840; Musgrave, A., *Bib. Austr. Ent.*, p. 55, 1932.
- COQUEREL, Charles. (1822-1867). Fairmaire, L., *B., Ann. Soc. Ent. France*, (4) 8: 301-308, 1868; Pollen, F. P. L., *B., Jaarb. Zool. Genootsch. Amsterdam*, pp. 151-160, 1870.
- COQUILLETT, Daniel William. (1856-1911). Banks, N., et al., *Ann. Ent. Soc. Amer.*, 5: 75, 1912; Banks, N., et al., *B., Proc. Ent. Soc. Wash.*, 13: 195-210, 1911; Brues, C. T., *Psyche*, 18: 159, 1911; Cresson, E. T., Jr., *P., Ent. News*, 22: 337-338, 1911; Hewitt, C. G., *Can. Ent.*, 43: 311-312, 1911; Walton, W. R., *Journ. N. Y. Ent. Soc.*, 22: 159-164, 1914; Musgrave, A., *B., Bib. Austr. Ent.* pp. 55-

- 60, 1932; Wade, J. S., *Proc. Ent. Soc. Wash.*, 38: 110-111, 1936; Howard, L. O., *P.*, *Hist. Applied Ent.*, 1930; Essig, E. O., *B.*, *P.*, *Hist. of Ent.*, pp. 588-592, 1931; Osborn, H., *P.*, *Fragments Ent. Hist.*, pp. 203-204, 1937.
- CORBETT, Herbert Henry. (1856-1921). *A.*, *Ent. News*, 32: 192, 1921; Porritt, G. T., *Ent. Mo. Mag.*, 57: 66-67, 1921; "B. D. J.", *Proc. Linn. Soc. Lond.*, pp. 46-47, 1920-21; Rothschild, L. W., *Trans. Ent. Soc. Lond.*, (*Proc.*): cxxix, 1921.
- CORDIER, Jules. (1811-1846). Fairmaire, L., *Ann. Soc. Ent. France*, (2) 5 (*Bull.*): xv-xvii, 1847.
- CORDUS, Valerius. (1515-1544). Locy, W. A., *P.*, *Story of Biol.*, pp. 229-240, 1925.
- CORNALIA, Emilio. (1825-1882). *A.*, *Leopoldina*, 18: 90, 158, 1882; *A.*, *Zool. Anzeiger*, 5: 316, 1882.
- CORNELIUS, Carl. (1805-1885). Dimmock, G., *Psyche*, 5: 35, 1888; Mik, J., et al., *Wien. Ent. Zeit.*, 4: 128, 1885.
- CORTI, Arnold. (1873-1932). Pfaff, G., et al., *Festchr. 50-jähr. Bestehen Internat. Ver. Frankfurt*, p. 6, 1934; Schneider-Orelli, O., *B.*, *Mitt. Schweiz. Ent. Ges.*, 15: 335-338, 1932; Draudt, M., *B.*, *P.*, *Ent. Rundschau*, 50: 73-77, 1933; *A.*, *Ent. Record*, 45: 142, 1933; Hellén, W., *Notulae Ent.*, 13: 52, 1933; *A.*, *Ent. Ztschr.*, *Frankfurt*, 46: 181, 1932.
- COSTA, Achille. (1828-1898). *A.*, *Ent. Mo. Mag.*, 35: 148, 1899; *A.*, *Deutsche Ent. Ztschr.*, 43: 222, 1899; *A.*, *Ent. News*, 10: 82, 1899; Musgrave, A., *Bib. Austr. Ent.*, p. 56, 1932; Howard, L. O., *P.*, *Smith. Misc. Coll.*, 84: 250, 1930; Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930.
- COUCH, Jonathan. (1789-1870). *A.*, *Proc. Linn. Soc. Lond.*, pp. 99-100, 1869-70.
- COUCKE, Edouard. ( -1899). Mik, J., *Wien. Ent. Zeit.*, 19: 88, 1900.
- COWAN, Frank. (1844-1905). Weiss, H. B., *B.*, *Ent. News*, 37: 212-214, 1926.
- COWAN, George Henry. (1886-1924). Cooley, R. A., *P.*, *Mont. State Bd. Ent. Bien. Rpt.*, 6: 14-15, 1925-26.
- COWAN, Thomas William. (1849-1926). "H. W. M.", *Proc. Linn. Soc. Lond.*, p. 79, 1926-27.
- COX, Henry Ramsay. (1844-1880). Carrington, J. T., *Entomologist*, 13: 248, 1880; *A.*, *Zool. Anzeiger*, 3: 528, 1880.
- CRABBE, George (1754-1832). Donisthorpe, H., *Ent. Record*, 44: 61, 1932.
- CRAGG, Francis William. (1882-1924). *A.*, *Ent. News*, 35: 262-263, 1924; *A.*, *B.*, *Indiana Journ. Med. Res.*, 12: 5-9, 1924; *A.*, *Science*, 59: 438, 1924; Green, E. E., *Trans. Ent. Soc. Lond.*, (*Proc.*): p. clxii, 1924; "W. A. H.", *Journ. Econ. Ent.*, 18: 563, 1925.
- CRASKE, Edmund Sydney. (1873-1943). Crow, P. N., *Entomologist*, 77: 48, 1944.
- CRAW, Alexander. (1850-1908). Kotinsky, J., *Journ. Econ. Ent.*, 1: 410-411, 1908; Kotinsky, J., *P.*, *Proc. Hawaiian Ent. Soc.*, 2: 24-26, 1908; Swezey, O. H., et al., *Ent. News*, 20: 48, 1909; Horn, W., *Deutsche Ent. Ztschr.*, p. 170, 1909; Essig, E. O., *B.*, *P.*, *Hist. of Ent.*, pp. 593-595, 1931.
- CRAWFORD, Frazer S. (1829-1890). Oliff, A. S., *Agr. Gaz. N. S. Wales*, 1: 288, 1890; *A.*, *Entomologist*, 24: 24, 1891; Riley, C. V., et al., *Insect Life*, 3: 354, 1891; Howard, L. O., *Smith. Misc. Coll.*, 84: 99, 392-393, 1930; Musgrave, A., *Bib. Austr. Ent.*, p. 57, 1932.
- CRAWFORD, William Monod. (1876-1942). Blair, K. G., *Proc. Roy. Ent. Soc. Lond.*, (C) 6: 40, 1941-42.
- CRESSON, Ezra Townsend, Sr. (1838-1926). *A.*, *P.*, *Ent. News*, 37: 161-163, 1926; Bradley, J. C., et al., *P.*, *Ann. Ent. Soc. Amer.*, 20: 139, 1927; Calvert, P. P., *Science*, n. s., 64: 8-9, 1926; Calvert, P. P., *P.*, *Trans. Amer. Ent. Soc.*, 52 (*Suppl.*): i-lxiii, 1928; Holland, W. J., *Ann. Carnegie Mus.*, 17: 195-196, 1927-27; Essig, E. O., *B.*, *P.*, *Hist. of Ent.*, pp. 595-597, 1931; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 186, 1937.
- CRESSON, George Bringhurst. (1859-1919). Calvert, P. P., *Ent. News*, 31: 29-30, 1920.
- CREVECOEUR, Ferdinand F. (1862-1931). Parker, R. L., *Journ. Econ. Ent.*, 24: 770, 1931; Parker, R. L., *Ent. News*, 42: 212, 1931; Parker, R. L., *P.*, *Journ. Kansas Ent. Soc.*, 4: 76, 1931; Smith, R. C., *B.*, *P.*, *Trans. Kansas Acad. Sci.*, 34: 138-144, 1931.

- CRIDDLE, Norman. (1875-1933). Gibson, A., et al., *P.*, Can. Ent., 65: 193-200, 1933; Hungerford, H. B., Ann. Ent. Soc. Amer., 27: 121-122, 1934.
- CRISTOFORI, Joseph de. (1803-1837). Villa, A., Ann. Soc. Ent. France, 6 (Bull.): xcvi-c, 1837.
- CRIVELLI, Giuseppe Balsamo. (1800-1874). Grobben, K., Bot. & Zool. in Oesterr. 1850-1900 Festschr., p. 532, 1901.
- CROFT, Henry Holmes. (1820-1883). *A.*, Ann. Rpt. Ent. Soc. Ont., 14: 81, 1883; *A.*, Can. Ent., 15: 78, 1883; Bethune, C. J. S., *P.*, Can. Ent., 48: 1-5, 1916.
- CROISSANDEAU, Jules. (1843-1895). Kraatz, G., Deutsche Ent. Zeitschr., 39: 7, 1895.
- CROSBY, Cyrus Richard. (1879-1937). Johannsen, O. A., Journ. Econ. Ent., 30: 221, 1937; *A.*, Ent. News, 48: 42, 1937; *A.*, Can. Ent., 69: 71, 1937; *A.*, Bull. Soc. Ent. France, 42: 113, 1937; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 161, 1937; Mickel, C. E., Ann. Ent. Soc. Amer., 31: 120, 1938; Osborn, H., Fragments Ent. Hist., p. 257, 1937.
- CROTCH, George Robert. (1842-1874). *A.*, Amer. Nat., 8: 512, 1874; Bethune, C. J. S., Can. Ent., 6: 160, 1874; *A.*, Nat. Can., 6: 269, 1874; Edwards, H., Proc. Calif. Acad. Sci., 5: 332-334, 1874; *A.*, Ent. Mo. Mag., 2: 70-72, 1874; *A.*, Pet. Nouv. Ent., 6 (104): 415, 1874; Musgrave, A., Bib. Austr. Ent., p. 58, 1932; Essig, E. O., *B.*, *P.*, Hist. of Ent., pp. 598-600, 1931.
- CROWLEY, Philip. (1837-1900). *A.*, Ent. Mo. Mag., 37: 49, 1901.
- CRUICKSHANK, Tertia Silvia. (1866-1905). *A.*, Can. Ent., 37: 196, 1905.
- CRUZ, Oswaldo Gonçalves. (1872-1917). Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- CULOT, Jules. (1861-1933). Pictet, A., *B.*, *P.*, Mitt. Schweiz. Ent. Ges., 16: 129-139, 1934; Oberthür, C., *P.*, Études Lép. Comp., 10 (plates): unpag., 1915.
- CUMMINGS, Bruce Frederic. (1889-1919). *A.*, Ent. Mo. Mag., 55: 264, 1919; *A.*, Ent. News, 31: 149, 1920; Musgrave, A., Bib. Austr. Ent., p. 59, 1932; *A.*, Nature, 104: 177, 1919.
- CUNNINGHAM, Allan. (1791-1839). Musgrave, A., Bib. Austr. Ent., p. 59, 1932.
- CUNNINGHAM, Thomas H. (1838-1916). *A.*, Can. Ent., 48: 180, 1916; Day, G. O., Proc. Ent. Soc. B. C., (System. Ser.), 8: 4, (*P.* in 9, Econ. Ser.), 1916.
- CURTIS, John. (1791-1862). Kellogg, V. L., Ent. News, 8: 75, 1897; Smith, F., Trans. Ent. Soc. Lond., (3) 1 (Proc.): 122-125, 1862; Swainson, W., *B.*, Bib. of Zool., p. 157, 1840; *A.*, Cent. Hist. Ent. Soc. Lond., pp. 139-140, 1933; *A.*, Proc. Linn. Soc. Lond., pp. xxxv-xli, 1863; Westwood, J. O., Ann. Soc. Ent. France, (4) 3: 525-540, 1863; Howard, L. O., *P.*, Hist. of Applied Ent. 1930.
- CUTHBERTSON, Alexander (1901-1942). Townsend, C. H. T., Rev. Ent. (Rio de J.), 13: 456-457, 1942; Munro, A. K., Journ. Ent. Soc. So. Africa, 5: 151, 1942.
- CUVIER, George Léopold Chrétien Frédéric Dagobert. (1769-1832). Gistel, J., Faunus, 1: 53, 1832; Audouin, V., Ann. Soc. Ent. France, 1: 317-332, 1832; Sachse, C. T., Allgem. Deut. Naturh. Zeit., 2: 459-463, 1847; Nordenskiöld, E. ik, *P.*, Hist. of Biol., pp. 331-343, 1935; Locy, W. A., *P.*, Story of Biol., pp. 342-350, 1925; Schenkling-Prévot, C., *P.*, Insekten-Börse, 14: 194, 201-202, 206-207, 212-213, 1897; Swainson, W., Bib. of Zool., pp. 157-161, 1840; Vienot, J., Bull. Mus. Paris, (2) 4: 202-207, 1932; Duméril, A. M. C., Consid. Gén. sur la Classe des Ind., pp. 262-264, 1823.
- CZWALINA, Gustave. (1841-1894). Seidlitz, G. von, *P.*, Deutsche Ent. Zeitschr., 38: 325-327, 1894.
- CYRILLO, Dominique. (See under Cirillo).
- CZEKLIUS, Daniel. (1857-1938). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 6: 188, 1939.
- CZIZEK, Karl. (1871-1925). Absolon, K., *B.*, *P.*, Acta Mus. Morav. (Brünn), 28-29: 290-295, 1931-32, (1933).
- DAECKE, Victor Arthur Erich. (1863-1918). *A.*, Ent. News, 29: 400, 1918; Calvert, P. P., Ent. News, 30: 58-60, 1919; Osborn, H., Fragments Ent. Hist., pp. 202-203, 1937.
- DAKIN, John A., (1852-1900). *A.*, Ent. News, 11: 451, 1900.

- DAHL, Friedrich. (1856-1929). Bischoff, H., B., P., Mitt. Zool. Mus. Berlin, 15: 625-632, 1930.
- DAHILBOM, Anders Gustav. (1806-1859). A., Stett. Ent. Zeit., 20: 337-340, 1859; A., Ann. Soc. Ent. France, (3) 7 (Bull.): cxxix, 1859.
- DALDORFF, Dagobert Carl de. ( -1802). Henriksen, K. L., Ent. Meddel., 15: 121-123, 1923.
- DALE, James Charles. (1792-1872). Westwood, J. O., Trans. Ent. Lond. (Proc.): 1, 1872; A., Pet. Nouv. Ent., 4: 197, 1872; Newman, E., Entomologist, 6: 56, 1872.
- DALLAS, Ernesto D. (1885-1943). Yepes, J., et al., P., Rev. Soc. Ent. Arg., 12: 3-6, 42-47, 148, 1943; Pirán, A. A., Rev. Arg. de Ent., 2 (4): 15-20, 1944.
- DALLAS, William Sweetland. (1824-1890). McLachlan, R., Ent. Mo. Mag., 26: 194-195, 1890; Musgrave, A., Bib. Austr. Ent., p. 61, 1932.
- DALLA-TORRE, Karl Wilhelm von. (1850-1928). A., Zool. Anzeiger, 77: 144, 1928; A., Wien. Ent. Zeit., 45: 104, 1928; Brehm, V., Wien. Ent. Zeit., 42: 29-32, 1925; Hepp, A., Ent. Ztschr., Frankfurt, 43: 29, 1929.
- DALMAN, Johann Wilhelm. (1787-1828). Strecker, H., B., Butterflies and moths of N. A., p. 219, 1878; Swainson, W., B., Bib. of Zool., p. 163, 1840; A., B., Vetensk. Acad. Handl. 1828, pp. 224, 231, 1829; Musgrave, A., Bib. Austr. Ent., p. 61, 1932.
- DALTRY, Thomas William. (1832-1904). Porritt, G. T., Ent. Mo. Mag., 41: 215, 1905.
- DAMBACHER, Jacob Josef. (1794-1868). Rudy, H., P., Arch. Insektenk. Oberrheingeb. 2: 41-52, 1926.
- DANNATT, Walter. (1863-1940). Newman, L. H., Entomologist, 73: 96, 1940.
- DARWIN, Charles Robert. (1808-1882). Carrington, J. T., Entomologist, 15: 97-101, 1882; Jenner Weir, J., Entomologist, 15: 101-102, 1882; Musgrave, A., Bib. Austr. Ent., p. 62, 1932; A., Cent. Hist. Ent. Soc. Lond., pp. 121-122, 1933; Nordenskiöld, Erik, P., Hist. of Biol., pp. 461-485, 1935; James, J. F., Journ. Cinc. Soc. Nat. Hist., 5: 71-77, 1882; "T. H. H.", Proc. Roy. Soc. Lond., 44: i-xxv, 1888; Müller, K., Die Natur, 25 (31): 336, 1876.
- DARWIN, Erasmus. (1731-1802). Nordenskiöld, Erik, Hist. of Biol., pp. 294-296, 1935.
- DAUBE, Pierre Gustave. (1807-1872). Lichtenstein, J., Ann. Soc. Ent. France, (5) 2: 517-520, 1872; Fauvel, A., Annuaire Ent., 1: 106-107, 1873; A., Pet. Nouv. Ent., 4: 264, 1873.
- DAVAINÉ, Casimir Joseph. (1812-1882). Laboulbène, A., Ann. Soc. Ent. France, (6) 4: 361-364, 1884.
- DAVID, Père Armand. (1826-1900). A., Ent. Mo. Mag., 37: 20, 1901.
- DAVIES, William Maldwyn. (1903-1937). Imms, A. D., Proc. Roy. Ent. Soc. Lond., ser. C, 2: 61, 1937; Laing, F., Ent. Mo. Mag., 73: 92-93, 1937.
- DAVIS, Alonzo Clayton. (1901-1942). A., U. S. Dept. Agr. Bur. Ent. & Plant Quar. News Letter, 9 (2): 1, 1942; Weigel, C. A., et al., B., P., Proc. Ent. Soc. Wash., 44: 33-36, 1942; Weigel, C. A., et al., Journ. Econ. Ent., 35: 294, 1942.
- DAVIS, Charles Abbott. (1869-1908). A., Ent. News, 19: 234, 1908; Burgess, A. F., Journ. Econ. Ent., 1: 165, 1908; A., Science, n. s., vol. 27, p. 237, 1908.
- DAVIS, Nelson Caryl. (1892-1933). Shannon, R. C., Ent. News, 45: 56, 1934; A., P., Rev. Biol. e Hyg. (Sao Paulo), 4: unpagged, 1933.
- DAVIS, William Morris. (1850-1934). Calvert, P. P., Ent. News, 45: 84, 1934.
- DAVY, John. (1790-1868). A., Proc. Roy. Soc. Lond., 16: lxix-lxxii, 1867-68.
- DAWSON, John Frederic. (1802-1870). Ent. Mo. Mag., 7: 216, 1871.
- DAY, George O. (1854-1942). Downes, W., Proc. Ent. Soc. Br. Col., 40: 34-35, 1943; P., only, l. c., 8, opp. p. 2, 1916.
- DEGEER, Carl. (1720-1778). Dow, R. P., Bull. Bklyn. Ent. Soc. 8: 38, 1913; Miall, L. C., Early Naturalists, their lives and work, pp. 277-288, 1912; Miall, L. C., Nat. Hist. Aquatic Insects, pp. 362-364, 1895; Swainson, W., Bib. of Zool., pp. 194-197, 1840; Jardine, W., P., Nat. Lib., 28: 59-66, 1848; Locy, W. A., P., Story of Biol., p. 268, 1925; Nordenskiöld, Erik, Hist. of Biol., p. 232, 1935; Dumeril, A. M. C., Consid. Gén. sur la Classe des Ins., pp. 249-252, 1823; How-



- ard, L. O., *P.*, Hist. Applied Ent., 1930; Essig, E. O., *P.*, Hist. of Ent., pp. 601-602, 1931.
- DEJEAN, Pierre François Marie August. (1780-1845). Dow, R. P., Bull. Bklyn. Ent. Soc., 8: 39, 1913; Dow, R. P., Bull. Bklyn. Ent. Soc., 9: 10-13, 37-39, 1914; Swainson, W., Bib. of Zool., p. 167, 1840; Howard, L. O., *P.*, Smith. Misc. Coll., 84: 205-206, 234, 1930; Musgrave, A., Bib. Austr. Ent., p. 62, 1932; Kraatz, G., Berlin Ent. Ztschr., 18: 138, 143-145, 1874; Boisdual, J. B., *P.*, Ann. Soc. Ent. France, (2) 3: 499-520, 1845; Howard, L. O., *P.*, Hist. of Applied Ent., 1930; Essig, E. O., *P.*, Hist. of Ent., pp. 603-604, 1931.
- DELAHAYE, Jules. (1826-1889). Clément, A. L., Ann. Soc. Ent. France, (6) 9: 501-504, 1889.
- DELAMONTAGNE, Alexandre. (1806-1836). Pierret, A., Ann. Soc. Ent. France, 5: (Bull.), pp. lxxx-lxxxii, 1836.
- DELAROUZÉE, Charles. (1835-1860). Baran, G. de, Ann. Soc. Ent. France, (4) 1: 259-264, 1861.
- DELLA TORRE E TASSO, Alesandro. (1881-1937). *A.*, Boll. Soc. Ent. Ital., 69: 33-34, 1937; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 161, 1937; *A.*, Koleopt. Rundschau, 23: 116, 1937.
- DENIER, Pedro Celestino Luis. (1892-1941). *A.*, Rev. Soc. Ent. Argentina, 11: 56, 1941; Del Ponte, E., *B.*, *P.*, Rev. Soc. Ent. Argentina, 11: 179-184, 1942; *A.*, Rev. Ent. (Rio de J.), 12: 681, 1941.
- DENNIS, George Christopher. (-1897). *A.*, Trans. Ent. Soc. Lond. (Proc.): lxxx-lxx, 1897.
- DENNY, Henry. (1803-1871). *A.*, Proc. Linn. Soc. Lond., pp. 84-85, 1870-71.
- DENNYS, Arthur Alexander. (1894-1942). Buckell, E. R., *B.*, Proc. Ent. Soc. B. C., 39: 2-3, 1942.
- DENTON, John M. (1829-1896). *A.*, *P.*, Can. Ent., 28: 115-116, 1896; Bethune, C. J. S., Ann. Rept. Ent. Soc. Ont., 27: 110-111, 1896; Osborn, H., Fragments Ent. Hist., p. 143, 1937.
- DEPUISSET, Louis Marie Alphonse. (1822-1886). Clément, A. L., Ann. Soc. Ent. France, (6) 6: 471-474, 1886.
- DESBROCHERS DES LOGES, Jules. (1836-1913). *A.*, Ent. News, 25: 48, 1914; Joannis, J. de, Bull. Soc. Ent. France, p. 357, 1913; Sainte-Claire Deville, J. Ent. Blätter, 10: 64, 1914; *A.*, Ent. Mo. Mag., 50: 43, 1914; *A.*, Miscellanea Ent., 21 (7): 49, 1913.
- DESGODINS, Auguste. (1826-1913). Oberthür, C., *P.*, Études Lép. Comp., 11: unpagéd, 1916.
- DESJARDINS, Julien Francois. (1799-1840). Audouin, V., et al., Rev. Zool., 3: 122-128, 1840; Silbermann, G., Revue Ent., 5: 351, 1837 (1840).
- DESLONGCHAMPS, Jacques Amand Eudes. (1794-1867). Crosse, H., et al., Journ. Conch., 16: 121, 1868.
- DESMAREST, Anselme Gaetan. (1784-1838). Blanchard, E., Ann. Soc. Ent. France, 7 (Bull.): xliii-xlvi, 1838.
- DESMAREST, Eugène. (1816-1889). *A.*, Ent. Mo. Mag., 26: 117, 1890; Laboulbène, A., Ann. Soc. Ent. France, (6) 10 (Bull.): v-vi, 1890.
- DESIGNES, Thomas. (1812-1868). *A.*, Ent. Mo. Mag., 5: 25-26, 1868; Newman, Entomologist, 4: 108, 1868; Bates, H. W., Trans. Ent. Soc. Lond. (Proc.): lvi, 1868.
- DETTMER, Heinrich. (1873-1933). Sala, I., et al., *B.*, *P.*, Broteria, 30: 5-9, 1934; Cremers, J., *B.*, *P.*, Natuurh. Maandblad, 22: 127-128, 1933.
- DEUBEL, Friedrich. (1843-1933). Holdhaus, K., *B.*, *P.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 35-48, 1936; Heikertinger, F., Koleopt. Rundschau, 19: 244-245, 1933.
- DEVILLE, Jean Sainte-Claire. (1870-1932). *A.*, Boll. Soc. Ent. Ital., 64: 109, 1932; Peyerimhoff, P. de, *B.*, *P.*, Ann. Soc. Ent. France, 102: 1-24, 1933; Blair, K. G., et al., Ent. Mo. Mag., 68: 167, 1932; Donisthorpe, H., Ent. Mo. Mag., 68: 215-216, 1932; Jeannel, R., Bull. Soc. Ent. France, 37: 157-158, 1932; Heikertinger, F., Koleopt. Rundschau, 19: 149-150, 1933.

- DEWITZ, Hermann. (1840-1890). "F.". Krancher's Ent. Jahrb., 1: 196-197, 1892; Mik, J., Wien. Ent. Zeit., 9: 159, 1890.
- DEYROLLE, Achille. (1813-1865). Grenier, A., Ann. Soc. Ent. France, (4) 6: 132-134, 1866.
- DICKERSON, Edgar Leek. (1878-1923). Weiss, H. B., *B.*, Ent. News, 35: 35-38, 1924.
- DIENER, Hugo. (1865-1935). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 2: 218, 1935; Székessy, V., Koleopt. Rundschau, 21: 56-57, 1935.
- DIETL, Albert. (1849-1906). Dittrich, R., Ztschr. Ent. (Breslau), 32: xlviii-xlix, 1907.
- DIETZ, Ottamar. (1854-1901). *A.*, Ent. News, 13: 64, 1902; Weiss, H. B., Journ. N. Y. Ent. Soc. 51, 290, 1943.
- DIETZ, William George. (1848-1932). Batchelor, M. D., *B.*, Ent. News, 43: 279-282, 1932; Hungerford, H. B., Ann. Ent. Soc. Amer., 26: 188, 1933.
- DIETZE, Karl. (1851-1925). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 2: 218, 1935; Seitz, A., Ent. Rundschau, 52: 177-178, 1935.
- DIGGLES, Silvester. (1817-1880). Musgrave, A., Bib. Austr. Ent., pp. 64-65, 1932.
- DIGUET, Léon. (1859-1926). Bois, M. D., *B.*, Bull. Mus. Paris, 32: 333-335, 1926; Calvert, P. P., Ent. News, 38: 261, 1927.
- DILLEN (DILLENIUS), Johann Jacob. (1684-1747). Féé, A. L. A., Mem. Soc. Sci. Lille, 1: 126-134, 242, 243, 1831 (1832).
- DIMMOCK, George. (1852-1930). Emerton, J. H., *P.*, Psyche, 37: 299, 1930; Calvert, P. P., Ent. News, 41: 280, 1930.
- DISTANT, William Lucas. (1845-1922). *A.*, Ent. Mo. Mag., 58: 66-67, 1922; *A.*, Ent. News, 33: 254-255, 1922; Campion, H., Entomologist, 55: 70-71, 1922; Rothschild, L. W., Trans. Ent. Soc. Lond. (Proc.): cx, 1922; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 65-67, 1932; Osborn, H., Fragments Ent. Hist., pp. 232-233, 1937.
- DIVEN, Emerson Lucas. (1899-1919). Busck, A., et al., *P.*, Proc. Ent. Soc. Wash., 21: 177-178, 1919.
- DIXEY, Frederick Augustus. (1855-1935). Turner, H. J., Ent. Record, 47: 28, 1935; Walker, J. J., Ent. Mo. Mag., 71: 44-45, 1935; Eltringham, H., Entomologist, 68: 118-119, 1935; Walker, J. J., Ent. News, 46: 118, 1935; Musgrave, A., Bib. Austr. Ent., p. 67, 1932.
- DIXON, Samuel Gibson. (1851-1918). *A.*, Ent. News, 29: 157, 1918.
- DOANE, Rennie Wilbur. (1871-1942). Pierson, C. J., Journ. Econ. Ent., 36: 131, 1943; Miller, J. M., Science, 98: 273-274, 1943; Osborn, H., *P.*, Fragments Ent. Hist., p. 258, 1937; Essig, E. O., Ann. Ent. Soc. Amer., 37: 130-131, 1944.
- DOBRÉE, Nicholas Frank. (1831-1908). *A.*, Ent. Record, 20: 48, 1908; Porritt, G. T., Ent. Mo. Mag., 44: 64-65, 1908; Brown, H. B., Entomologist, 41: 47-48, 1908; Horn, W., Deutsche Ent. Zeitschr., p. 428, 1908.
- DOBERO, Agostino. ( -1937). *A.*, Boll. Soc. Ent. Ital., 69: 113, 1937.
- DODGE, Edgar A. ( -1933). Van Duzee, E. P., Pan-Pacific Ent., 9: 52, 1933.
- DOEDERLEIN, Ludwig. (1855-1936). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 151, 1936; *A.*, Koleopt. Rundschau, 22: 121, 1936.
- DOHERTY, William. (1857-1901). Hartert, E., *B.*, Novitates Zool., 8: 494-506, 1901.
- DOHRN, Carl August. (1806-1892). *A.*, Ent. News, 3: 192, 1892; *A.*, Psyche, 6: 300, 1892; Godman, F. D., Trans. Ent. Soc. Lond. (Proc.), p. xlviii, 1892; Grote, A. R., Can. Ent., 24: 181-182, 1892; Dchrn, H., *P.*, Stett. Ent. Zeit., 53: 281-322, 1892; Douglas, J. W., Ent. Mo. Mag., 28: 164-165, 1892; Musgrave, A., Bib. Austr. Ent., pp. 69-70, 1932; Lefèvre, E., Ann. Soc. Ent. France, Cl. (Bull.): cxv, 1892; *A.*, Insect Life, 5: 211, 1893.
- DOHRN, Felix Anton. (1840-1909). Semenov-Tian-Shanskv, A., Rev. Russe Ent., 9: 345, 1909; Smith, G., Proc. Linn. Soc. Lond., pp. 89-90, 1909-10; *A.*, Arch. Hydrobiol., 5: 85, 1909; *A.*, *P.*, Pop. Sci. Mo., 76: 98-101, 1910.
- DOHRN, Wolfgang Ludwig Heinrich. (1838-1913). Musgrave, A., Bib. Austr. Ent., p. 70, 1932; Kuhnt, P., Deutsche Ent. Ztschr., p. 722, 1913.
- DOKHTOUROFF, Vladimir Serghyeevich. (1859-1890). *A.*, Ann. Soc. Ent. France, (6) 10 (Bull.): xc, 1890; Musgrave, A., Bib. Austr. Ent., p. 70, 1932.
- DOLESCHALL, Heinrich. (1855-1936). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 300, 1936; Hoffman, F., Ent. Ztschr. (Frankfurt), 50: 189, 1936.
- DOLL, Jacob. (1847-1929). Engelhart, G. P., *P.*, Bull. Bklyn. Ent. Soc., 24: 104-109, 1929; Osborn, H., *P.*, Fragments Ent. Hist., pp. 144, 291, 1937.



- DOLLFUSS, Ernest. (1852-1872). Gaulle, J. de, *Ann. Soc. Ent. France*, (5) 2: 5-6, 1872; Fauvel, A., *Annuaire Ent.*, 1: 104-106, 1873; Hofer, M., *Pet. Nouv. Ent.*, 4: 201-202, 1872.
- DOLLMAN, Hereward Clune. (1888-1919). *A.*, *Ent. News*, 31: 30, 1920; "H. D.", *Ent. Record*, 31: 39-40, 1919; "J. G. D.", *Ent. Mo. Mag.*, 55: 139-140, 1919.
- DONCASTER, Leonard. (1877-1920). *A.*, *Ent. News*, 31: 240, 1920; *A.*, *Science*, n. s., 52: 11, 1920.
- DONCEEL, Charles Donckier. (1802-1888). Dimmock, G., *Psyche*, 5: 155, 1889; Sélvs-Longchamps, E. de, *B.*, *Ann. Soc. Ent. Belg.* 32 (Bull.): liii-lv, 1888.
- DÖNITZ, Wilhelm. (1832-1912). Kolbe, H., *B.*, *Deutsche Ent. Ztschr.*, p. 246, 1912.
- DONOVAN, Edward. (1768-1837). Musgrave, A., *Bib. Austr. Ent.*, pp. 70-71, 1932.
- DONZEL, Hugo Fleury. (1791-1850). Mulsant, E., *Ann. Soc. Linn. Lyon*, 1: 363, 1853.
- DONZEL, Hugues. (1810-1879). *A.*, *Naturaliste*, 2: 159, 1880.
- DORFMEISTER, Georg. (1810-1881). Holzinger, J. B., *Mitt. Nat. Ver. Steiermark*, 20: xxvii-xxxiii, 1883.
- DORIA, Giacoma. (1840-1913). Cavanna, G., *Bull. Soc. Ent. Ital.*, 45: 239-244, 1914; Gestro, R., *Ann. Soc. Ent. France*, 82: 790-791, 1913.
- DÖRRIES, F. (1822-1917). *A.*, *P.*, *Internat. Ent. Ztschr.*, 14: 113, 1920.
- DOUBLEDAY, Edward. (1810-1849). Douglas, J. W., *Trans. Ent. Soc. Lond.*, n. s., 1, (Proc.): 1-2, 1850; Strecker, H., *B.*, *Butterflies and Moths of N. A.*, p. 219, 1878; Westwood, J. O., *Gardner's Chron.*, p. 71, 1850; *A.*, *B.*, *Proc. Linn. Soc. Lond.*, 2: 84-87, 1850; Douglas, J. W., *Zoologist*, 8: 2712, 1850; Musgrave, A., *Bib. Austr. Ent.*, p. 71, 1932.
- DOUBLEDAY, Henry. (1809-1875). *A.*, *Ent. Mo. Mag.*, 12: 69-71, 1875; Dunning, J. W., *P.*, *Entomologist*, 10: 53-61, 1877; Saunders, S. S., *Trans. Ent. Soc. Lond.*, (Proc.), p. xxxi, 1875; Mullens, W. H., et al., *Bib. Brit. Ornith.*, pp. 174-176, 1916; *A.*, *Pet. Nouv. Ent.*, 7: 520, 1875.
- DOUÉ, Pierre Achille Augustin. (1791-1869). Buquet, L., *Ann. Soc. Ent. France*, (4) 9, (Bull.): lvi-lviii, 1869.
- DOUGLAS, John William. (1814-1905). Saunders, E., *Ent. Mo. Mag.*, 41: 221-222, 1905; *A.*, *Ent. Record*, 17: 246-248, 1905; *A.*, *Entomologist*, 38: p. 264, 1905.
- DOUGLASS, Benjamin Wallace. ( -1939). *A.*, *Science*, 90: 558, 1939.
- DOUMERC, Adolphe Jacques Louis. (1802-1868). Girard, M., *B.*, *Ann. Soc. Ent. France*, (4) 8: 885-896, 1868; Targioni-Tozzetti, A., et al., *Bull. Soc. Ent. Ital.*, 2: 100, 1870.
- DOURS, Jean Antoine. (1824-1874). Laboulbène, A., *B.*, *Ann. Soc. Ent. France*, (5) 4: 353-358, 1874; *A.*, *Pet. Nouv. Ent.*, 6: 424, 1874.
- DOW, Robert Percy. (1865-1936). Engelhardt, G. P., *B.*, *P.*, *Bull. Bklyn. Ent. Soc.*, 32: 1-4, 1937.
- DOWELL, Philip. (1864-1936). Mickel, C. E., *Ann. Ent. Soc. Amer.*, 31: 120, 1938.
- DREWSEN, Christian. (1799-1896). Meinert, F., *P.*, *Ent. Meddel.*, 5: 195-200, 1896; Henriksen, K. L., *B.*, *P.*, *Ent. Meddel.*, 15: 176-179, 1925.
- DRUCE, Hamilton Herbert Charles James. (1868-1922). *A.*, *Ent. News*, 33: 320, 1922; Riley, N. D., *Entomologist*, 55: 215-216, 1922; Musgrave, A., *B.b. Austr. Ent.*, p. 72, 1932; *A.*, *Ent. Mo. Mag.*, 58: 211-212, 1922; Rothschild, L. W., *Trans. Ent. Soc. Lond.*, (Proc.): cxx, 1922.
- DRUCE, Herbert. (1846-1913). *A.*, *Ent. Mo. Mag.*, 49: 277, 1913; *A.*, *Entomologist*, 46: 199, 1913; *A.*, *Ent. News*, 24: 432, 1913; Bethune-Baker, G. T., *Ent. Record*, 25: 172, 1913; Musgrave, A., *Bib. Austr. Ent.*, p. 72, 1932; "B. D. J.", *Proc. Linn. Soc. Lond.*, pp. 54-55, 1912-13.
- DRUITT, Alan. (1863-1933). *A.*, *Ent. Record*, 45: 64, 1933; "W. P. C.", *Entomologist*, 66: 96, 1933.
- DRURY, Dru. (1725-1803). Cockerell, T. D. A., *Sci. Mo.*, 14: 67-82, 1922; Dow, R. P., *Bull. Bklyn. Ent. Soc.*, 8: 38, 1913; Jardine, W., *P.*, *Nat. Lib.*, 13: (Mammalia), pp. 17-71, 1842; Strecker, H., *B.*, *Butterflies and Moths of N. A.*, p. 220, 1878; Swainson, W., *B.*, *Bib. of Zool.*, pp. 171-172, 1840; Weiss, H. B., *Ent. News*, 38: 208-214, 1927; Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, p. 255, 1823.

- DUCKETT, Allen Bowie. (1891-1918). Popenoe, C., et al., *B.*, Proc. Ent. Soc. Wash., 20: 185-186, 1918.
- DUCROTAY DE BLAINVILLE, Marie Henri. (See under Blainville).
- DUDA, Ladislaus. ( -1895). *A.*, Ent. News, 6: 340, 1895; *A.*, Leopoldina, 31: 218, 1895.
- DUFOUR, Léon. (1780-1865). Pascoe, F. P., Ent. Mo. Mag., 2: 48, 1865; Pascoe, F. P., Trans. Ent. Soc. Lond., (3) 2, (Proc.): pp. 137-138, 1865; Swainson, W., Bib. of Zool., p. 172, 1840; Locy, W. A., Story of Biol., p. 272, 1925; Dubedout, M., Ann. Soc. Ent. France, (4) 5: 211-213, 1865; Laboulbène, A., *B.*, *P.*, Ann. Soc. Ent. France, (4) 5: 214-252, 1865; *A.*, Ann. Soc. Ent. France, (4) 5, (Bull.): pp. xx-xxi, 1865; Hagen, H., Stett. Ent. Zeit., 27: 57-63, 1866; *A.*, Amer. Journ. Sci., (2) 40: 140, 1865; Mik, J., Wien. Ent. Zeit., 18: 256, 1899.
- DUFTSCHMID, Kaspar. ( - ). Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., p. 266, 1823.
- DUGÉS, Alfredo. (1827-1910). Howard, L. O., *P.*, Hist. Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., 1937.
- DUHAMEL DU MONCEAU, Henry Louis. (1700-1782). Simmons, P., *P.*, Journ. Econ. Ent. 22: 820-821, 1929.
- DUJARDIN, Felix. (1801-1860). Nordenskiöld, Erik, Hist. of Biol., pp. 428-429, 1935; Malagutti, Mem. Soc. Acad. Maine et Loire, 10: 1-16, 1861.
- DUMERIL, André Marie Constant. (1774-1860). Milne Edwards, H., Ann. Soc. Ent. France, (3) 8: 647-650, 1860; Laboulbène, A., Ann. Soc. Ent. France, (3) 8: 651-652, 1860; Nickles, J., Amer. Journ. Sci., (2) 31: 266-267, 1861; Flourens, M. J. P., Mem. Acad. France, 35: 1-22, 1866; *A.*, Zool. Garten, 11: 288, 1870; Gervais, P., *B.*, Nouv. Arch. Mus. Hist. Nat. 7: (Bull.): 15-24, 1871; *A.*, Journ. Zool., 1: 85-91, 1872; *A.*, *B.*, Proc. Linn. Soc. Lond., pp. xlv-xlviii, 1861; Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., pp. 264-265, 1823.
- DUMMER, R. A. ( - ). Alexander, C. P., Ent. News, 34: 192, 1923.
- DUMONT, D'URVILLE, Jules Sébastien César. (1790-1842). Musgrave, A., Bib. Austr. Ent., pp. 73-74, 1932.
- DUNNING, Joseph William. (1833-1897). Trimen, R., Trans. Ent. Soc. Lond., (Proc.), pp. lxx-lxxi, 1897; McLachlan, R., Ent. Mo. Mag., 33: 281-283, 1897; Goss, H., Entomologist, 30: 331-332, 1897; Musgrave, A., Bib. Austr. Ent., pp. 74-75, 1932; *A.*, Cent. Hist. Ent. Soc. Lond., pp. 137-138, 1933.
- DUPERREY, Louis Isidore. (1786-1865). Musgrave, A., Bib. Austr. Ent., p. 75, 1932.
- DUPONCHEL, Philogène Auguste Joseph. (1774-1846). Guérin-Meneville, F. E., Ann. Soc. Ent. France, (2) 4, (Bull.): iv-vi, 1846; Duméril, C., Ann. Soc. Ent. France, (2) 4, (Bull.): vii-viii, 1846; Duméril, C., *B.*, Ann. Soc. Ent. France, (2) 5: 5-17, 1847.
- DUPONT, H. ( -1873). *A.*, Pet. Nouv. Ent., 5: 331, 1873.
- DUPUY, Gabriel. (1846-1913). Oberthür, C., *P.*, Études Lép. Comp., 11: unpagéd, 1916.
- DURRANT, John Hartley. (1863-1928). Busck, A., Proc. Ent. Soc. Wash., 30: 40, 1928; *A.*, Ent. News, 39: 295-296, 1928; *A.*, Ent. Mo. Mag., 64: 67, 1928; Turner, H. J., Ent. Record, 40: 47-48, 1928; Riley, N. D., *P.*, Entomologist, 61: 73-75, 1928; Collin, J. E., Proc. Ent. Soc. Lond., 3: 103, 1929.
- DURY, Charles. (1847-1931). Braun, A. F., *B.*, Ent. News, 42: 293-296, 1931; Braun, A. F., *B.*, *P.*, Proc. Junior Soc. Nat. Sci. (Cincinnati, O.), 2 (3): 53-55, 60-63, 1931; Osborn, H., *P.*, Fragments Ent. Hist., pp. 212-213, 1937; Braun, A. F., *P.*, Ohio Journ. Sci., 31: 512-514, 1931.
- DUSKE, Georgii Augustovich. ( -1908). Kusnezov, N. J., Rev. Russe Ent., 7: 174, 1908.
- DUTROCHET, René Joaquim Henri. (1776-1847). Brongniart, A., Bot. Zeotung, 12: 163-167, 1854.
- DUVIVIER, Antoine. ( -1896). *A.*, Leopoldina, 32: 100, 1896; Lameere, A., Ann. Soc. Ent. Belg., 40: 63-64, 1896; Kraatz, G., Deutsche Ent. Ztschr., 40: 7, 1896.
- DVIGHUBSKII, Ivan Aleksyevich. (1771-1839). Rouillier, C., *B.*, Bull. Moscou, 13: 342-359, 1840.
- DYAR, Harrison Gray. (1866-1929). *A.*, Ent. News, 40: 100, 1929; Forbes, W. T. M., *P.*, Ent. News, 40: 165-167, 1929; Aldrich, J. M., Ent. News, 40: 167-168,

- 1929; Heinrich, C., *Can. Ent.*, 61: 46-47, 1929; Howard, L. O., *Science*, 69: 151-152, 1929; Wetmore, A., *Rpt. U. S. Nat. Mus.*, p. 40, 1929; Musgrave, A., *Bib. Austr. Ent.*, pp. 75-76, 1932; Wade, J. S., *Proc. Ent. Soc. Wash.*, 38: 112-113, 1936; Weiss, H. B., *Journ. N. Y. Ent. Soc.*, 51: 286-287, 1943; Essig, E. O., *B., P.*, *Hist. of Ent.*, pp. 608-610, 1931; Osborn, H., *Fragments Ent. Hist.*, p. 199, 1937.
- DYE, Franklin. (1835?-1920). Weiss, H. B., *Ent. News*, 31: 180, 1920.
- DZIERZON, Johannes. (1811-1906). Hamsch, M., *Jahresb. Schles. Ges. Vaterl. Cultur.*, 84: 21-26, 1906 (1907); Krancher, O., *P.*, *Insekten-Börse*, 22: 6-7, 1905; *A.*, *Leopoldina*, 42: 157, 1906.
- EATON, Alfred Edwin. (1845-1929). *A.*, *Ent. News*, 41: 63, 1930; *A.*, *Ent. Mo. Mag.*, 65: 112, 1929; Edwards, F. W., *Entomologist*, 62: 167-168, 1929; Musgrave, A., *Bib. Austr. Ent.*, p. 76, 1932; Jordan, K., *Proc. Ent. Soc. Lond.*, 4: 130, 1930.
- ECKSTEIN, Karl. (1859-1939). Sachtleben, H., *Arb. phys. angew. Ent. Berlin-Dahlem*, 6: 208, 1939; *A., P.*, *Ztschr. angew. Ent.*, 26: 682, 1940.
- EDLESTON, Robert Smith. (1819-1872). Newman, E., *Entomologist*, 6: 272, 1872; *A.*, *Ent. Mo. Mag.*, 9: 167, 1872; *A.*, *Pet. Nouv. Ent.*, 4: 265, 1873.
- EDMUNDS, Abraham. (1804-1869). *A.*, *Ent. Mo. Mag.*, 6: 42, 1869.
- EDWARDS, Thomas. (1814-1886). Smiles, S., *P.*, Harper, N. Y., pp. 1-301, 1877.
- EDWARDS, Frederick Wallace. (1888-1940). *A.*, *Ent. News*, 52: 30, 1940; Blair, K. G., *Ent. Mo. Mag.*, 77: 20, 1941; Smart, J., *P.*, *Entomologist*, 74: 22-24, 1941; Usinger, R. L., *Pan-Pacific Ent.*, 17: 84, 1941; Alexander, C. P., *Can. Ent.*, 73: 94-95, 1941; *A.*, *Rev. Ent. (Rio de J.)*, 12: 415-416, 1941; "E. E. B.", *Rev. Soc. Ent. Argentine*, 11: 292-293, 1942; Porter, C. E., *P.*, *Rev. Chilena Hist. Nat.*, 44: 366-387, 1940.
- EDWARDS, George. (1694-1773). Fée, A. L. A., *Mem. Soc. Sci. Lille*, 1: 187-188, 1831 (1832).
- EDWARDS, Henry. (1830-1891). *A., P.*, *Ent. News*, 2: 129-130, 1891; *A.*, *Insect Life*, 3: 489-490, 1891; *A.*, *Psyche*, 6: 118, 1891; Beutenmüller, W., *Can. Ent.*, 23: 141-142, 259-267, 1891; Beutenmüller, W., *Ann. Rpt. Ent. Soc. Ont.*, 22: 96-97, 1891; Smith, J. B., *P.*, *Pop. Sci. Mo.*, 76: 471-472, 1910; Musgrave, A., *Bib. Austr. Ent.*, pp. 76-77, 1932; Essig, E. O., *Hist. of Ent.*, pp. 611-612, 1931; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 162, 1937.
- EDWARDS, Henry Milne. (1800-1885). Westwood, J. O., *Ent. Mo. Mag.*, 22: 95-96, 1885; McLachlan, R., *Trans. Ent. Soc. Lond.*, (Proc.): xl-xli, 1885; Laboulbène, A., *Ann. Soc. Ent. France*, (6) 5: 463-466, 1885; Quatrefages, A. de, *Arch. Zool. Exp.*, (2) 4: 1-16, 1886; Berthelot, M., *Ann. Rpt. Bd. Regents Smithsn. Inst.* 1893, *Misc. Doc.* 184, pt. 1, pp. 708-727, 1894; *A.*, *Naturaliste*, 7 (16): 121-122, 1885; Locy, W. A., *P.*, *Story of Biol.*, p. 350, 1925.
- EDWARDS, James. (1856-1928). Turner, H. J., *P.*, *Ent. Mo. Mag.*, 64: 279, 1928.
- EDWARDS, Stanley. (1864-1938). Turner, H. J., *Proc. Linn. Soc. Lond.*, pp. 311-312, 1937-38.
- EDWARDS, William Henry. (1822-1909). *A.*, *Can. Ent.*, 41: 173, 1909; *A., P.*, *Ent. News*, 20: 193-194, 1909; Bethune, C. J. S., *P.*, *Ann. Rpt. Ent. Soc. Ont.*, 25: 87-88, 1895; Bethune, C. J. S., *P.*, *Can. Ent.*, 28: 1-2, 1896; Bethune, C. J. S., *P.*, *Can. Ent.*, 41: 245-248, 1909; Dixey, F. A., *Trans. Ent. Soc. Lond.*, (Proc.): lxxxix, 1909; Smith, J. B., *P.*, *Pop. Sci. Mo.*, 76: 471, 1910; Weeks, A. G., Jr., *B., P.*, *Ill. of Diurnal Lepidoptera*, 2: 11 pp., (unpaged), 1911; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 142, 1937.
- EGGER, Johann. (1804-1866). Schiner, J. R., *B.*, *Verh. zool.-bot. Ges. Wien.*, 17: 531-540, 1867; *A.*, *Verh. zool.-bot. Ges. Wien.*, 16 (Sitz.): 49-50, 1866.
- EHRENBERG, Christian Gottfried. (1795-1876). Müller, K., *Natur*, 2: 372, 1876; *A.*, *Ber. Senckenb. Nat. Ges.*, pp. 8, 143-144, 1877-78; *A.*, *Zool. Garten*, 17: 304, 1876; von Kobell, W. X. F., *Sitz. Bayer. Akad. Wiss. München*, 7: 140-142, 1877; *A.*, *Proc. Amer. Acad. Arts & Sci.*, 12: 327-328, 1876-77; Levat, L. A., *Bull. Soc. Etud. Angers*, 8-9: 173-179, 1878-79; Locy, W. A., *P.*, *Story of Biol.*, pp. 221-223, 1925; Nordenskiöld, Erik, *Hist. of Biol.*, pp. 427-428, 1935.

- EHRHORN, Edward Macfarlane. (1862-1941). Usinger, R. L., *Pan-Pacific Ent.*, 17: 84, 1941; Swezey, O. H., et al., *B., P.*, *Proc. Haw. Ent. Soc.*, 11: 134-137, 1942; Howard, L. O., *P.*, *Hist. of Applied Ent.*, pp. 398, 410, 1930; Essig, E. O., *B., P.*, *Hist. of Ent.*, pp. 613-614, 1931; Osborn, H., *P.*, *Fragments Ent. Hist.*, pp. 259-260, 1937.
- EHRMAN, George Alexander, (1862-1926). *A.*, *Ann. Carnegie Mus.*, 16: 351-352, 1926; Holland, W. J., *Ent. News*, 37: 95-96, 1926.
- EICHWALD, Eduard von. (1795-1876). Stricker, W., *Zool. Garten*, 18: 72, 1877.
- EISEN, Gustavus August. (1847-1941). Usinger, R. L., *Pan-Pacific Ent.*, 17: 84, 1941; *A.*, *Rev. Ent. (Rio de J.)*, 12: 416, 1941; Essig, E. O., *B., P.*, *Hist. of Ent.*, pp. 615-616, 1931.
- EKBLOM, Axel. ( -1914). Mjöberg, E., *P.*, *Ent. Tidskr.*, 35:221-222, 1914.
- EKEBERG, Hans Jonas. (1805-1889). Sandahl, O., *Ent. Tidskr.*, 10: 161-164, 1889.
- ÉLIE DE BEAUMONT, Jean Baptiste Armand Louis Léonce. (1798-1874). Dumas, J. P., et al., *C. R. Acad. Paris*, 79: 710-723, 1874; *A.*, *Gaea*, 10: 704, 1874; *A.*, *Amer. Journ. Sci.*, (3) 8: 404, 1874; Pierre, I., *Bull. Soc. Linn. Normandie*, pp. 3-4, 1876; Bertrand, J., *Mem. Acad. Sci. Inst. France*, 39: ix-xxvi, 1877; *A.*, *Journ. de Zool.*, 3: 461, 1874.
- ELIOT, Samuel Lowell. (1844-1889). Packard, A. S., *Ent. Amer.*, 5: 83-84, 1889.
- ELLIOTT, Ernest A. ( -1936). Imms, A. D., *Proc. Roy. Ent. Soc. Lond.*, (C) 1: 55, 1937.
- ELLIS, John. (1710-1776). Fée, A. L. A., *Mem. Soc. Sci. Lille*, 1: 169-185, 1831 (1832).
- ELLISOR, Lewie Owen. (1910-1939). Mickel, C. E., *Ann. Ent. Soc. Amer.*, 33: 217, 1940; Bilsing, S. W., *P.*, *Journ. Econ. Ent.*, 33: 588, 1940.
- ELSTER, George Rudolph. (1897-1940). *A.*, *Ann. Ent. Soc. Amer.*, 35: 121, 1942.
- ELTRINGHAM, Harry. (1873-1941). Lloyd, R. W., *P.*, *Ent. Mo. Mag.*, 78: 16, 1942; *A.*, *Ent. News*, 53: 60, 1942; Blair, K. G., *Proc. Roy. Ent. Soc. Lond.*, (C) 6: 40, 1941-42.
- ELWES, Henry John. (1846-1922). *A.*, *Journ. Econ. Ent.*, 16: 233-234, 1923; Bethune-Baker, G. T., *Ent. Record*, 34: 224-225, 1922; Rothschild, L. W., *Trans. Ent. Soc. Lond.*, (Proc.): cxx-ccxi, 1922; Skinner, H., *Ent. News*, 34: 64, 1923; Musgrave, A., *Bib. Austr. Ent.*, pp. 78-79, 1932; *A.*, *Journ. Bombay Nat. Hist. Soc.*, vol. 29, pp. 267-268, 1924; *A.*, *Ent. Mo. Mag.*, 59: 19-20, 1923.
- ELY, Charles Russell. (1870-1939). Wade, J. S., et al., *B., P.*, *Proc. Ent. Soc. Wash.*, vol. 41, pp. 139-140, 1939; *A.*, *Arb. morph. taxon. Ent. Behlin-Dahlem*, 6: 349, 1939; Mickel, C. E., *Ann. Ent. Soc. Amer.*, 33: 217, 1940; Wade, J. S., *Proc. Ent. Soc. Wash.*, 38: 113, 1936.
- EMERTON, James Henry. (1847-1930). *A.*, *Can. Field Nat.*, 45: 90, 1931; Calvert, P. P., *Ent. News*, 42: 95, 1931; Davis, J. J., *Ann. Ent. Soc. Amer.*, 24: 188, 1931; Banks, N., *B., P.*, *Psyche*, 39: 1-8, 1932; Banks, N., *Can. Ent.*, 63: 23-24, 1931.
- EMERY, Carlo. (1848-1925). Forel, A., *Bull. & Ann. Soc. Ent. Belg.*, 65: 198-199, 1925; Grandi, G., *B., P.*, *Mem. Soc. Ital.*, 4: 201-222, 1925; Wheeler, W. M., *Ent. News*, 36: 318-320, 1925; Porter, C. E., *P.*, *Rev. Chilena Hist. Nat.*, 30: 338-340, 1926; Musgrave, A., *Bib. Austr. Ent.*, p. 79, 1932; Wasmann, E., III *Internat. Ent. Kong. Zurich* 1925, 1: 39-40, 1926; Forel, A., *Bull. Soc. Vaudoise Sci. Nat.*, 56: 23-24, 1925.
- EMMONS, Ebenezer. (1799-1863). *A.*, *Pop. Sci. Mo.*, 48: 406-411, 1896; Marcon, J., *B., P.*, *Amer. Geol.*, 7: 1-23, 1891; Marcon, J., *P.*, *Science*, 5: 456-458, 1885; Perry, J. B., *Proc. Bost. Soc. N. H.*, 12: 214-216, 1869; Scudder, S. H., *Proc. Bost. Soc. N. H.*, 12: 261, 1869; Strecker, H., *B.*, *Butterflies and moths of N. A.*, p. 225, 1878; Walton, W. R., *Proc. Ent. Soc. Wash.*, 23: 85-86, 1921; Youmans, W. J., *P.*, *Pioneers of science in America*, pp. 347-353, 1896; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 141, 1937.
- ENGELHARDT, George Paul. (1871-1942). Torre-Bueno, J. R. de la, *Bull. Bklyn. Ent. Soc.*, 37: 45, 1942; Teale, E. W., *P.*, *Bull. Bklyn. Ent. Soc.*, 37: 153-157, 1942.
- ENGELHART, Christian. (1857-1919). Hoistebro, H. O., *B., P.*, *Ent. Medd.*, 13: 97-107, 1920.

- ENGELMANN, Wilhelm. (1808-1878). Carus, J. V., *Zool. Anzeiger*, 1: 396, 1878; Ehlers, E., *P., Ztschr. Wiss. Zool.*, 32: 1-12, 1879.
- ENOCK, Frederick. (1845-1916). *A., Ent. Mo. Mag.*, 52: 163-164, 1916; *A., Ent. News*, 27: 382, 1916; Adkin, R., *Entomologist*, 49: 215-216, 1916; Bethune-Baker, G. T., *Ent. Record*, 29: 218-219, 1917.
- EPPELSHEIM, Eduard. (1837-1896). Heyden, L. von, *P., Deutsche Ent. Ztschr.*, 40: 366-367, 1896.
- ERB, Herman G. (1870-1940). *A., Bull. Bklyn. Ent. Soc.* 35: 143, 1940.
- ERICHSON, Wilhelm Ferdinand. (1809-1849). Klug, J. C. F., *Stettin Ent. Zeit.*, 11: 33-36, 1850; Musgrave, A., *Bib. Austr. Ent.*, pp. 82-83, 1932.
- ERICSON, Isaac Birger. (1847-1920). Ostrand, C. H., *P., Ent. Tidskr.*, 42: 227-230, 1921.
- ERSCHOFF, Nicolas. (1837-1896). Alphéraky, S., *B., P., Horae Soc. Ent. Ross.*, 31: xi-xix, 1897.
- ESCHER-KÜNDIG, Jakob. (1842-1930). Escher, K., *B., P., Mitt. Schweiz. Ent. Ges.*, 15: 1-4, 1930.
- ESCHSCHOLTZ, Johann Friedrich. (1793-1831). Gistel, J., *Faunus*, 1: 53-54, 1832; Musgrave, A., *Bib. Austr. Ent.*, p. 83, 1932; Dow, R. P., *Bull. Bklyn. Ent. Soc.*, 9: 98, 1914; Essig, E. O., *B., P., Hist. of Ent.*, pp. 617-622, 1931.
- ESMARK, Lauritz. (1806-1884). Dimmock, G., *Psyche*, 4: 266, 1885.
- ESTRUP, Peder Jungersen. (1797-1830). Henriksen, K. L., *Ent. Meddel.*, 15: 222-223, 1926.
- EVANS, Alwen Mylanwy. ( -1937). *A., Arb. morph. taxon. Ent. Berlin-Dahlem*, 5: 72, 1938; *A., Ann. Trop. Med. & Parasit.*, 31: 341, 1937; Imms, A. D., *Proc. Roy. Ent. Soc. Lond.*, ser. C, 2: 60-61, 1937.
- EVANS, William. (1850-1922). *A., Ent. News*, 34: 255, 1923; *A., Ent. Mo. Mag.*, 59: 20-21, 1923.
- EVERTS, Edouard Jacques Guillaume. (1849-1932). Oudemans, J. T., *B., P., Tidschr. Ent.*, 76: 1-46, 1933; Cremers, Natuurh. Maandblad, 21: 74-75, 1932.
- EWERS, William B. (1871-1935). Mickel, C. E., *Ann. Ent. Soc. Amer.*, 30: 182, 1937.
- EXNER, Sigmund. (1846-1926). *A., Ent. News*, 37: 126-127, 1926; *A., Science*, n. s., 63: 227, 1926.
- FABRE, Jean Henri. (1823-1915). *A., Can. Ent.*, 47: 352, 1915; *A., Ent. News*, 26: 423-424, 1915; *A., Proc. Ent. Soc. Wash.*, 18: 2, 1916; Bicknell, P. F., *P., Human Side of Fabre*, Unwin, 1923; Bouvier, E. L., *Ann. Rpt. Smithsn. Inst.* 1916, pp. 587-597, 1917; Bouvier, E. L., *Revue générales des Sciences pures et appliquées*, Ann. 26, no. 22, pp. 634-639, 1915; Sharp, D., *Ent. Mo. Mag.*, 51: 332-333, 1915; Fabre, A., *Life of Jean Henri Fabre, the Entomologist* (Trans. by B. Miall), Dodd, New York, 1921; Ferton, C., *Rev. Scientifique*, no. 18, pp. 545-557, 1916; Rowland-Brown, H., *Entomologist*, 48: 271-272, 1915; Hewitt, C. G., *P., Can. Ent.*, 47: 381-383, 1915; Howard, L. O., *P., Nat. Hist.*, 22: 319-325, 1922; Julian, P., *Living Age*, 323: 436-440, 1924; Legros, C. V., *Fabre, Poet of Science*, Unwin, 1921; Lockhead, W., *P., Ann. Rpt. Ent. Soc. Ont.*, 45: 61-70, 1914 (1915); Miall, B., *Life of Fabre the Entomologist*, Hodder, 1921; Wheeler, W. M., *Journ. Anim. Behavior*, 6: 74-80, 1916; *A., P., Luonnon Ystävä*, 19: 173-177, 1915; Locy, W. A., *P., Story of Biol.*, pp. 276-277, 1925; Standfuss, M., *Internat. Ent. Ztschr.*, 9: 121-123, 1916; Cholodkovsky, N. A., *Rev. Russe Ent.*, 16: lxxi-lxxxviii, 1916; Rostand, P., *Soc. Ent. France Livre du Cent.*, pp. 101-105, 1932; Rabaud, E., *Bull. Soc. Ent. France*, p. 234, 1915; Howard, L. O., *P., The Mentor*, Aug., pp. 56-57, 1924; Koelsch, A., *Ent. Ztschr.*, Frankfurt, 29: 62-63, 1915; Essig, E. O., *P., Hist. of Ent.*, pp. 622-625.
- FABRICIUS, Johann Christian. (1745-1808). Latreille, P. A., *Ann. Mus. Hist. Nat. (Paris)*, 11: 393-404, 1808; *Autobiography* (trans. by F. W. Hope), *P., Trans. Ent. Soc. Lond.* 4 (Append): i-xvi, 1845-47; Henriksen, K. L., *P., Ent. Meddel.*, 15: 84-97, 1922-23; Musgrave, A., *Bib. Austr. Ent.*, pp. 86-88, 1932; *Autobiography*, Kieler Blättern, 1: 88-117, 1819 (facsimile rep. by Julius Schuster, *P.*

- Berlin, 1928); Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, pp. 255-257, 1823; Howard, L. O., *P.*, *Hist. Applied Ent.*, 1930.
- FABRICIUS, Otho. (1744-1822). Henriksen, K. L., *P.*, *Ent. Meddel.*, 15: 81-83, 1922.
- FACKLER, H. L. (1894-1935). Bentley, G. M., *Journ. Econ. Ent.*, 29: 224-225, 1936.
- FAHRAEUS, Olaf Immanuel. (1796-1884). *A.*, *Psyche*, 4: 236, 1884; Dunning, J. W., *Trans. Ent. Soc. Lond.*, (Proc.): xlii-xliii, 1884; Sandahl, O. T., et al., *B.*, *P.*, *Ent. Tidskr.*, 5: 111-114, 209-210, 1884; Ragonot, E. L., *Ann. Soc. Ent. France*, (6) 4 (Bull.): xciii, 1884.
- FAIRMAIRE, Léon. (1820-1906). *A.*, *Deutsche Ent. Ztschr.*, p. 11, 1906; Léveillé, A., *B.*, *P.*, *Ann. Soc. Ent. France*, 76: 529-558, 1907; Semenov, A. P., *Rev. Russ. Ent.*, 6: 384, 1907; Musgrave, A., *Bib. Austr. Ent.*, pp. 88-89, 1932.
- FALCONER, Hugh. (1808-1865). *A.*, *Proc. Linn. Soc. Lond.*, pp. 99-100, 1864-65; *A.*, *Geol. Mag.*, 2: 142-144, 191, 1865; *A.*, *Proc. Roy. Soc. Lond.*, 15: xiv-xx, 1866-67.
- FALCOZ, Louis. (1870-1938). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 6: 69, 1939; Roman, E., *Bull. Soc. Ent. France*, 43: 197, 1938; Porter, C. E., *Rev. Chilena Hist. Nat.*, 42: 349-350, 1938.
- FALDERMANN, Franz. (1799-1838). Mannerheim, C. G. von, *B.*, *Bull. Moscou*, 12: 34-43, 1839.
- FALL, Henry Clinton. (1862-1939). Sherman, J. D., 4th Suppl. *Leng. Cat. Coleopt.*, p. 72, 1939; *A.*, *Ent. News*, 51: 51, 1940; Cockerell, T. D. A., *Science*, 90: 609, 1939; Linsley, E. G., *P.*, *Pan-Pacific Ent.*, 16: 1-3, 1940; Mickel, C. E., *Ann. Ent. Soc. Amer.*, 33: 217-218, 1940; Sherman, J. D., *P.*, *Journ. N. Y. Ent. Soc.*, 48: 33-36, 1940; *A.*, *Ent. News*, 51: 106, 1940; Darlington, P. J., Jr., *B.*, *P.*, *Psyche*, 47: 45-54, 1940; Tanner, V. M., *Great Basin Nat.*, 1: 62, 1940; Essig, E. O., *B.*, *P.*, *Hist. of Ent.*, pp. 625-627, 1931; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 234, 1937.
- FALLOU, Jules Ferdinand. (1812-1895). *A.*, *Ent. Mo. Mag.*, 31: 221-222, 1895; *A.*, *Ent. News*, 6: 340, 1895; *A.*, *Leopoldina*, 31: 218, 1895; Laboulbène, A., *B.*, *P.*, *Ann. Soc. Ent. France*, 66: 106-108, 156-164, 1897.
- FANTHAM, Harold Benjamin. (1877-1937). Monro, H. A. U., *Can. Ent.*, 69: 255-256, 1937; *A.*, *Arb. phys. angew. Ent. Berlin-Dahlem*, 5: 78, 1938.
- FARN, Albert Brydges. (1841-1921). Frohawk, F. W., *Entomologist*, 54: 303-304, 1921; *A.*, *Ent. Mo. Mag.*, 57: 278, 1921; Jenkinson, F., *Ent. Mo. Mag.*, 58: 20-22, 1922.
- FARREN, William. (1836-1887). *A.*, *Ent. Mo. Mag.*, 24: 235, 1888; Carrington, J. T., *Entomologist*, 21: 71-72, 1888.
- FASSL, A. H. (1876-1922). Pfaff, G., et al., *P.*, *Festschr. 50-jähr. Bestehen Ent. Ver.*, Frankfurt, p. 7, 1934; Seitz, A., *Ent. Rundschau*, 39: 45, 1922; *A.*, *Ent. News*, 36: 96, 1925.
- FAUSSEK, Victor. (1861-1910). Kusnezov, N. J., *B.*, *P.*, *Rev. Russe Ent.*, 10: 251-261, 1910.
- FAUST, Johannes. (1832-1903). Heller, K. M., *B.*, *P.*, *Deutsche Ent. Ztschr.*, 47: 401-410, 1903; Musgrave, A., *Bib. Austr. Ent.*, p. 89, 1932; Semenov, A., *P.*, *Rev. Russe Ent.*, 3: 419-421, 1903.
- FAUVEL, Albert. (1840-1921). Surcouf, J., *Bull. Soc. Ent. France*, pp. 57-58, 1921; *A.*, *Ent. Mo. Mag.*, 57: 161, 1921.
- FAZ, Alfredo. ( ). Davis, J. J., *Ann. Ent. Soc. Amer.*, 25: 250, 1932.
- FEDTSCHENKO, Aleksyey Pavlovich. (1844-1873). *A.*, *Pet. Nouv. Ent.*, 5: 347, 1873; Lohde, G., *Berlin. Ent. Ztschr.*, 17: 236-238, 1873.
- FEISTHAMEL, Joachim François Philiberto de. (1791-1851). Buquet, L., *Ann. Soc. Ent. France*, (2) 9, (Bull.): ix-x, 1851.
- FELDER, Cajetan von. (1814-1894). Rogenhofer, A. F., *Iris*, 7: 363, 1894; *A.*, *Leopoldina*, 31: 54, 1895; Rebel, H., *P.*, *Bot. & Zool. in Oesterr. 1850-1900 Festschr.*, pp. 323-324, 1901; Musgrave, A., *Bib. Austr. Ent.*, p. 90, 1932.
- FELDER, Rudolph. (1842-1871). Schiner, J. R., *B.*, *Verh. zool-bot. Ges. Wien.*, 22: 41-50, 1872; *A.*, *Pet. Nouv. Ent.*, 1: 122, 1871.
- FELDMAN, Henry. (1814-1887). "F.", *P.*, *Ent. News*, 7: 129-131, 1896; Osborn, H., *P.*, *Fragments of Ent. Hist.*, p. 231, 1937.



- FELT, Ephraim Porter. (1868-1943). *A.*, Science, 98: 555, 1943; *A.*, *P.*, N. Y. Times, Dec. 15, p. 27, 1943; Burgess, A. F., Fernald Club Year Book (Mass. State Coll.), 4: 1-2, 1935; Muesbeck, F. W., et al., *P.*, Proc. Ent. Soc. Wash., 46: 27-29, 1944; Howard, L. O., *P.*, Hist. of Applied Ent., 1930; Essig, E. O., *B.*, *P.*, Hist. of Ent., pp. 627-629, 1931; Osborn, H., *P.*, Fragments Ent. Hist., pp. 231-232, 1937; *A.*, Ent. News, 55: 35, 1944; Bromley, S. W., *B.*, *P.*, Journ. N. Y. Ent. Soc., 52: 223-236, 1944.
- FENN, Charles. ( -1925). Adkin, R., Entomologist, 59: 120, 1926.
- FENYES, Adelbert. (1863-1937). Fall, H. C., *P.*, Pan-Pacific Ent., 13: 145-147, 1937; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 352, 1937; Blackwelder, R. E., *B.*, Pan-Pacific Ent., 18: 17-22, 1942.
- FERGUSON, Eustace William. (1884-1927). Carter, H. J., *B.*, *P.*, Austr. Zool., 5: 114-120, 1927; *A.*, *P.*, Rpt. Dir.-Gen. Pub. Health N. S. W., p. i, 1927; Cambage, R. H., Proc. Linn. Soc. N. S. Wales, 53: iv-v, 1928; Musgrave, A., Bib. Austr. Ent., pp. 90-92, 1932.
- FERNALD, Charles Henry. (1838-1921). *A.*, Nat. Cyclop. Amer. Biog., 9: 232, 1907; *A.*, Proc. Ent. Soc. Wash., 23: 68, 1921; Braun, A. F., Ent. News, 32: 129-133, 1921; Burgess, A. F., *P.*, Journ. Econ. Ent., 14: 242-243, 1921; Howard, L. O., Science, n. s., 32: 769-775, 1910; Musgrave, A., Bib. Austr. Ent., p. 92, 1932; Procter, W., *P.*, Biol. Surv. Mt. Desert Region, 1: 7, 1927; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., p. 178, 1937.
- FERNALD, Maria E. (1839-1919). Felt, E. P., Journ. Econ. Ent., 13: 153, 1920.
- FERRER, Ascensio Codina. (1876-1932). Navas, L., Bol. Soc. Ent. Espan., 15: 120-124, 1932.
- FERTON, Charles. (1856-1921). Rabaud, E., *B.*, Ann. Soc. Ent. France, 90: 346-351, 1921; Surcouf, J., Bull. Soc. Ent. France, p. 155, 1921.
- FESTA, Enrico. ( -1939). *A.*, Boll. Soc. Ent. Ital., 71: 169, 1939.
- FICHT, George Augustus. (1900-1941). Davis, J. J., *P.*, Journ. Econ. Ent., 34: 864, 1941; Davis, J. J., Ann. Ent. Soc. Amer., 35: 121-122, 1942.
- FICKERT, Karl Rudolph Dietrich. (1849-1904). Linden, M. von, *B.*, Leopoldina, 40: 52-54, 1904.
- FIEBER, Franz Xaver. (1807-1872). *A.*, Ent. Mo. Mag., 8: 278-279, 1872; Puton, A., Petit Nouv. Ent., 4: 191, 1872; Handlirsch, A., *P.*, Bot. & Zool. in Oesterr. 1850-1900 Festschr., pp. 302-305, 1901; Westwood, J. O., Trans. Ent. Soc. Lond. (Proc.): li, 1872; Osborn, H., *P.*, Fragments Ent. Hist., 1937.
- FIELD, George Hamilton. (1850-1937). Abbott, C. G., Ent. News, 48: 270-272, 1937; Essig, E. O., *P.*, Hist. of Ent. pp. 629-630, 1931.
- FIELD, Herbert Haviland. (1868-1921). *A.*, Ent. News, 32: 182-183, 1921; *A.*, Wiener Ent. Zeit., 38: 148, 1921.
- FIELDE, Adele Marion. (1839-1916). Calvert, P. P., Ent. News, 27: 191-192, 1916; Stevens, H. N., *P.*, Field Memorial Com., 377 pp. 1918.
- FINDAL, J. Kristian. (1871-1938). Hansen, V., *P.*, Ent. Meddel., 20: 585-586, 1940.
- FINLAY, Carlos Juan. (1833-1915). *A.*, Ent. News, 26: 384, 1915; Hoffmann, W. H., *P.*, Rev. Chilena Nat. Hist., 44: 83-91, 1940; Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- FINOT, Pierre Adrien Prosper. (1838-1908). *A.*, Ent. Mo. Mag., 44: 160, 1908; Hancock, J. L., Ent. News, 19: 396, 1908; *A.*, Ent. Record, 20: 147, 1908; Burr, M., *P.*, Ent. Record, 20: 218-220, 1908.
- FIORI, Andrea. (1854-1933). *A.*, Boll. Soc. Ent. Ital., 65: 173, 1933; Grandi, G., *B.*, *P.*, Mem. Soc. Ent. Ital., 12: 209-214, 1933; *A.*, Koleopt. Rundschau, 21: 57, 1935.
- FIRTH, John. (1832-1885). Dimmock, G., Psyche, 5: 35, 1888.
- FISCHER, Heinrich Leopold. ( -1886). Dimmock, G., Psyche, 5: 35, 1888.
- FISCHER, Johann Baptist. (1804-1832). Gistel, Faunus, 1: 50, 1832.
- FISCHER VON RÖSLERSTAMM, Josef Emanuel. (1787-1866). Mann, J., Verh. zool.-bot. Ges. Wien., 16, (Sitzb.) 51-54, 1866.
- FISCHER VON WALDHEIM, Gotthelf. (1771-1854). Amyot, C. J. B., Ann. Soc. Ent. France, (3) 3: 323-325, 1855; Motschulsky, V. von, Etudes Ent., 4: 3-5, 1855; Dow, R. P., Bull. Bklyn. Ent. Soc., 9: 98, 1914; Essig, E. O., *P.*, Hist. of Ent.



- pp. 631-632, 1931; Newman, E., *Trans. Ent. Soc. Lond.*, (Proc.): 150, 1852-53.
- FITCH, Asa. (1809-1879). *A.*, *Can. Ent.*, 12: 66-67, 1880; *A.*, *Ent. News*, 7: 65, 1896; *A.*, *Nat. Cyclop. Amer. Biog.*, 7: 252, 1897; Fitch-Andrews, A. M., *P.*, *N. Y. Gen. & Biog. Record*, 34: 155-158, 1903; Lintner, J. A., *Psyche*, 2: 273-276, 1879; Riley, C. V., *Amer. Ent.*, 3: 121-123, 1880; Smith, J. B., *P.*, *Pop. Sci. Mo.*, 76: 475, 1910; Strecker, H., *B.*, *Butterflies and Moths of N. A.*, pp. 228-229, 1878; Thurston, E. P., *P.*, *Pop. Sci. Mo.*, 16: 116-120, 1879; Goding, F. W., *P.*, *Trans. N. Y. St. Ag. Soc.* 50th Ann. Rpt. 1890, pp. 358-361, 1891; Howard, L. O., *Ann. Rpt. Smithsn. Inst.*, p. 389, 1930; Howard, L. O., *P.*, *Hist. Applied Ent.*, 1930; Osborn, H. P., *Fragments of Ent. Hist.*, 1937; Essig, E. O., *P.*, *Hist. of Ent.*, pp. 632-634, 1931.
- FITZINGER, Leopold Joseph. (1802-1884). *A.*, *Psyche*, 4: 236, 1884.
- FLEISCHER, Anton. (1850-1934). Heyrovsky, L., *P.*, *Acta Soc. Ent. Cechoslov.*, 31: 145-146, 1934; *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 2: 63, 1935; *A.*, *Koleopt. Rundschau*, 21: 238, 1935.
- FLEMING, John. (1785-1857). Bryson, A., *B.*, *Trans. Roy. Soc. Edinburgh*, 22: 655-680, 1860-61.
- FLETCHER, James. (1852-1908). *A.*, *P.*, *Can. Ent.*, 30: 1-2, 1898; *A.*, *P.*, *Ent. News*, 19: 445-447, 1908; Bethune, C. J. S., *P.*, *Ann. Rpt. Ent. Soc. Ont.*, 28: 96, 1897; Bethune, C. J. S., *P.*, *Ann. Rpt. Ent. Soc. Ont.*, 39: 147-149, 1908; Bethune, C. J. S., et al., *P.*, *Can. Ent.*, 40: 433-437, 1908; Fisher, S. A., et al., *P.*, *Can. Ent.*, 42: 285-290, 1910; Gibson, A., et al., *B.*, *P.*, *Ottawa Nat.*, 22: 189-234, 1909; Howard, L. O., *Ann. Rpt. Ent. Soc. Ont.*, 39: 149-150, 1908; Smith, J. B., *P.*, *Journ. Econ. Ent.*, 1: 408-409, 1908; Smith, J. B., *P.*, *Pop. Sci. Mo.*, 76: 477, 1910; Howard, L. O., *P.*, *Hist. Applied Ent.*, 1930; Osborn, H., *P.*, *Fragments Ent. Hist.*, pp. 170-171, 1937.
- FLETCHER, Joseph James. (1850-1926). Ferguson, E. W., *Proc. Linn. Soc. N. S. W.*, 52: v-vi, 1927; "W. B. S.", *P.*, *Proc. Linn. Soc. N. S. W.*, 52: xxxiii-xlii, 1927; *A.*, *B.*, *Proc. Linn. Soc. N. S. W.*, 54: 686-687, 1929; Musgrave, A., *Bib. Austr. Ent.*, pp. 93-94, 1932.
- FLETCHER, William Holland Ballett. ( -1941). *A.*, *Ent. Record*, 53: 56, 1941; Blair, K. G., *Proc. Roy. Ent. Soc. Lond.*, (C) 6: 41, 1941-42.
- FLINT, Wesley Pillsbury. (1882-1943). Calvert, P. P., *Ent. News*, 54: 174, 1943; Davis, J. J., *P.*, *Journ. Econ. Ent.*, 36: 644-645, 1943; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 261, 1937; Metcalf, C. L., *Ann. Ent. Soc. Amer.*, 37: 131-132, 1944.
- FLOHR, Julius. (1837-1896). *A.*, *Ent. News*, 7: 192, 1896; Champion, G. C., *Ent. Mo. Mag.*, 32: 91-92, 1896; Meldola, R., *Trans. Ent. Soc. Lond.*, (Proc.): xciv-xcv, 1896; Kraatz, G., *Deutsche Ent. Ztschr.*, 40: 367, 1896; *A.*, *Leopoldina*, 32: 138, 1896.
- FOERSTER, Arnold. (1810-1884). Wackerzapp, O., *B.*, *Stett. Ent. Zeit.*, 46: 209-218, 1885; Dalla Torre, C. W. von, *B. Jahresh. Nat. Ges. Graubünden*, 28: 44-57, 1885; Wackerzapp, C., *B.*, *Verh. Nat. Ver. Rheinl.*, 43, (Corresp.-Bl.), 33-41, 1886; Van Segvelt, E., *Ann. Soc. Ent. Belg.*, 28, (C. R.): cclxxix-cclxxx, 1884; *A.*, *Psyche*, 4: 236, 1884; Mik, J., et al., *Wien. Ent. Zeit.*, 3: 288, 1884.
- FOLLIAS, Alexis Rupert. (1813-1873). Buquet, L., *Ann. Soc. Ent. France*, (5) 3 (Bull.): cv-cvi, 1873; *A.*, *Pet. Nouv. Ent.*, 5: 307, 1873.
- FOLSOM, Justus Watson. (1871-1936). *A.*, *Ent. News*, 47: 256, 1936; Davis, J. J., *P.*, *Journ. Econ. Ent.*, 29: 1178-1179, 1936; *A.*, *Science*, 84: 325, 1936; "A. S. H.", *Science*, 84: 343-344, 1936; *A.*, *Can. Ent.*, 69: 71, 1937; Mickel, C. E., *Ann. Ent. Soc. Amer.*, 30: 182, 1937; *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 4: 161, 1937; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 207, 1937.
- FONSCOLOMBE, Etienne Laurent Joseph Hippolyte Boyer de. (1772-1853). Saporita, G. de, *Ann. Soc. Ent. France*, (3) 1 (Bull.): xiii-xiv, 1853; Mulsant, E., *B.*, *Ann. Soc. Linn. Lyon*, 1: 337-352, 1853.
- FORBES, Stephen Alfred. (1844-1930). Osborn, H., *P.*, *Journ. Econ. Ent.*, 23: 472-473, 1930; Metcalf, C. L., *Ent. News*, 41: 175-178, 1930; Forbes, E. B., *P.*, *Memorial of Funeral Services, Univ. Ill.*, pp. 1-40, 1930; Ward, H. B., *Science*, 71: 378-381, 1930; Blair, J. C., *Trans. Ill. Hort. Soc.*, 64: 372, 1930; Howard,

- L. O., et al., *B., P.*, Nat. Acad. Sci. Biog. Mem., 15 (1): 1-54, 1932; Howard, L. O., Hist. Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., p. 221, 1937.
- FORBES, William Alexander. (1855-1883). Dunning, J. W., Trans. Ent. Soc. Lond., (Proc.): xlii, 1883.
- FOREL, Auguste Henri. (1848-1931). Cockerell, T. D. A., Science, 86: 350-352, 1937; Bugnion, E., *B., P.*, Mitt. Schweiz. Ent. Ges., 15: 156-193, 1931; *A.*, Wien. Ent. Zeit., 48: 116, 1931; Musgrave, A., Bib. Austr. Ent., pp. 95-96, 1932; Donisthorpe, H., Ent. Record, 43: 176, 1931; Eltringham, H., Proc. Ent. Soc. Lond., 6: 107, 1932; *A.*, Koleopt. Rundschau, 17: 204, 1931; Escherich, K., Ztschr. angew. Ent., 19: 151-153, 1932; Brun, R., *P.*, Mitt. Deutsch. Ent. Ges., 2: 129-136, 1931; Osborn, H., *P.*, Fragments Ent. Hist., 1937.
- FORSIUS, Runar. (1884-1935). Nordström, A., *P.*, Notulae Ent., 15: 65-67, 1935; Tullgren, A., *P.*, Ent. Tidskr., 56: 189-190, 1935; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 151, 1936; Frey, R., *P.*, Mem. Soc. Fauna Flora Fenn., 12: 223-226, 239-242, 1935-36.
- FORKSAL, Pehr. (1732-1763). Henriksen, K. L., *P.*, Ent. Meddel., 15: 48-51, 1921-22.
- FORTUNE, Robert. (1813-1880). *A.*, Leopoldina, 16: 95, 1880; *A.*, Naturaliste, 2: 223, 1880.
- FOSTER, Edward. (1863-1930). Holloway, T. E., Journ. Econ. Ent., 23: 1017-1018, 1930.
- FOSTER, Shirley Watscn. (1884-1923). *A.*, Journ. Econ. Ent., 17: 162, 1924.
- FOUDRAS, Antoine Casimir Marguerite Eugène. (1783-1859). Falcoz, L., Échange, 28: 19-22, 27-29, 36-38, 43-45, 51-52, 61-63, 66-68, 1912.
- FOURCROY, Antoine François. (1755-1809). Swainson, W., Bib. of Zool., p. 192, 1840; Nordenskiöld, Erik, Hist. of Biol., pp. 370-371, 1935.
- FOWLER, William Weekes. (1849-1923). *A.*, Ent. News, 34: 255-256, 1923; Arrow, G. J., Entomologist, 56: 170, 1923; Walker, J. J., *P.*, Ent. Mo. Mag., 59: 150, 1923; Musgrave, A., Bib. Austr. Ent., p. 96, 1932; "B. D. J.", Proc. Linn. Soc. Lond., p. 54, 1923-24.
- FOX, Carroll. (1875-1936). *A.*, Ent. News, 48: 30, 1937; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 161, 1937.
- FOX, William Henry. (1857-1921). *A.*, Proc. Ent. Soc. Wash., 23: 213, 1921; Wade, J. S., Proc. Ent. Soc. Wash., 38: 115, 1936.
- FRANCILLON, John. ( - ). Musgrave, A., Bib. Austr. Ent., p. 96, 1932.
- FRANCK, George. (1839-1923). Bather, W. T., *P.*, Bull. Bklyn. Ent. Soc., 19: 1-3, 1924.
- FRANCOIS, Philippe. ( - ). Simon, E., *B.*, Ann. Soc. Ent. France, 77: 839-840, 1908.
- FRANTZIUS, Alexander von. (1821-1877). Ecker, A., Arch. Anthropol., 10: 343, 1877-78.
- FRAUNFELD, Georg. von. (1807-1873). Brunner von Wattenwyl, K., *P.*, Verh. Zool.-Bot. Ges. Wien, 23: 535-538, 1873; *A.*, Proc. Linn. Soc. Lond., pp. 1-li, 1873-74; *A.*, Zool. Garten, 14: 139, 1873; Brunner von Wattenwyl, K., *P.*, Bot. & Zool. in Oesterr. 1850-1900 Festschr., pp. 4-5, 1901.
- FRENCH, Charles. (1840-1933). Pescott, E. E., *P.*, Victorian Nat., 50: 57-60, 1933; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 1: 310, 1934; Horn, W., Arb. phys. angew. Ent. Berlin-Dahlem, 1: 305, 1934; Howard, L. O., *P.*, Hist. Applied Ent., 1930.
- FRENCH, George Hazen. (1841-1935). Karlovic, J. K., Ent. News, 46: 258, 1935; *A.*, Arb. morph. taxon. Berlin-Dahlem, 3: 64, 1936; Karlovic, J. K., *B.*, only, Ent. News, 48: 94-97, 1937; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., pp. 180-181, 1937.
- FREY, Heinrich. (1822-1890). Stierlin, G., *B.*, Mitt. Schweiz. Ent. Ges., 8: 211-216, 1890; Hofmann, O., Stett. Ent. Zeit., 51: 40-44, 1890; Stainton, H. T., Ent. Mo. Mag., 26: 113-117, 1890; Kraatz, G., Deutsche Ent. Ztschr., 34: 26, 1890.
- FREY-GEISSNER, Emile. (1826-1917). *A.*, Ent. News, 29: 240, 1918; Gahan, C. J., Trans. Ent. Soc. Lond., (Proc.): cx, 1917.

- FRIEDLANDER, Julius. (1827-1882). *A.*, Leopoldina, 18: 210, 1882.
- FRIEDRICH, Otto. (1800-1880). Geiser, S. W., Southwest Review, 17: 444-445, 1932; Geiser, S. W., Naturalists of the frontier, p. 323, 1937.
- FRINGS, Karl. (1874-1931). Seitz, A., Ent. Rundschau, 48: 161, 1931; Pfaff, G., et al., Festschr. 50 jähr. Bestehen Internat. Ent. Ver. Frankfurt, p. 7, 1934.
- FRISCH, Johann Leonhard. (1666-1743). Miall, L. C., Early Naturalists, their lives and work, pp. 240-244, 1912; Swainson, W., Bib. of Zool., p. 193, 1840; Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., pp. 248-249, 1823; Howard, L. O., *P.*, Hist. Applied Ent., 1930.
- FRISENDAHL, Axel. (1890-1919). Lundblad, O., *B.*, *P.*, Ent. Tidskr., 40: 53-61, 1919.
- FRITSCH, Karl. (1812-1879). *A.*, Ent. Nachr., 6: 18, 1880; *A.*, Anzeiger, 3: 120, 1880.
- FRIVALDSZKY VON FRIVALD, Eméric. (1799-1870). "E. D.", Ann. Soc. Ent. France, (5) 1: 468, 1871; Kraatz, G., Berliner Ent. Ztschr., 15: ix, 1871; Wallace, A. R. Trans. Ent. Soc. Lond., (Proc.): liii, 1871; *A.*, Pet. Nouv. Ent., 3: 125, 1871.
- FROGGATT, Walter Wilson. (1858-1937). Walker, J. J., Ent. Mo. Mag., 73: 165-166, 1937; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 241, 1937; *A.*, Arb. phys. angew. Ent. Berlin-Dahlem, 4: 246, 1937; Imms, A. D., Proc. Roy. Ent. Soc. Lond., ser. C, 2: 61-62, 1937; Musgrave, A., Bib. Austr. Ent., pp. 101-114, 1932; Howard, L. O., *P.*, Hist. Applied Ent., 1930.
- FRUEHSTORFER, Hans. (1863-1922). *A.*, Ent. News, 33: 256, 1922; Riley, N. D., Entomologist, 55: 144, 1922.
- FRY, Alexander. (1821-1905). *A.*, Ent. Mo. Mag., 41: 119, 1905.
- FRYER, Alfred. (1826-1912). Bennett, A., Proc. Linn. Soc. Lond., pp. 46-47, 1911-12.
- FRYER, Herbert Fortescue. (1854-1930). Fryer, J. C. F., Ent. Mo. Mag., 66: 114, 1930; Jordan, K., Proc. Ent. Soc. Lond., 5: 131-132, 1931.
- FUCHS, Carl. (1839-1914). *A.*, Ent. News, 25: 384, 1914; Blaisdell, F. E., et al., *P.*, Proc. Calif. Acad. Sci., (4) 8: 27-34, 1918; Blaisdell, F. E., Science, n. s., 40: 91-92, 1914; Grinnell, F., Bull. Bklyn. Ent. Soc., 9: 72-73, 1914; Leng, C. W., *P.*, Bull. Bklyn. Ent. Soc., 9: 73-76, 1914; Essig, E. O., *P.*, Hist. of Ent., pp. 635-637, 1931; Osborn, H., Fragments Ent. Hist., p. 144, 1937.
- FUCHS, Robert. ( - 1934). *A.*, Koleopt. Rundschau, 22: 121, 1936.
- FUENTE, José M. de la. (1855-1932). Navas, L., *P.*, Bol. Soc. Ent. Espan., 15: 125-127, 1932.
- FÜLDNER, Johann Moritz. (1818-1873). Arndt, C., Arch. Ver. F. Nat. Mecklenburg, 28: 143-147, 1874.
- FULLER, Andrew Samuel. (1828-1896). *A.*, Ent. News, 7: 192, 1896; Howard, L. O., *P.*, Hist. Applied Ent., p. 22, 1930.
- FULLER, Claude. (1872-1928). *A.*, Journ. Econ. Ent., 22: 282, 1929; Musgrave, A., Bib. Austr. Ent., p. 116, 1932; Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- FYLES, Thomas W. (1832-1921). *A.*, Ann. Rpt. Ent. Soc. Ont., 27: 1, 1896; *A.*, *P.*, Can. Ent., 29: 25, 1897; *A.*, Ent. News, 33: 128, 1922; Bethune, C. J. S., Can. Ent., 53: 262-264, 1921; Osborn, H., Fragments Ent. Hist., p. 143, 1937.
- GABB, William More. (1839-1878). Essig, E. O., Hist. of Ent., p. 638, 1931.
- GABRIEL, Conrad. (1841-1937). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 351, 1937; *A.*, Koleopt. Rundschau, 23: 244, 1937.
- GADAMER, Hermann Friedrich Rudolf Heinrich. Gadamer, (1818-1885). Dimmock, G., Psyche, 5: 35, 1888.
- GAGLIARDI, Gaetano Maria. ( - ). (Costa, O. G., Trans. Ent. Soc. Lond., 4, (Proc.): xix, 1845-47.
- GAHAN, Charles Joseph. (1862-1939). *A.*, Ent. Mo. Mag., 75: 40, 1939; *A.*, Can. Ent., 71: 54, 1939; Arrow, G. J., Nature, 143: 401, 1939; *A.*, Arb. morph. taxon. Ent., Berlin-Dahlem, 6: 188, 1939; *A.*, Indian Journ. Ent., 1: 128, 1939; Musgrave, A. Bib. Austr. Ent., p. 117, 1932; *A.*, Mus. Journ. (Lond.), 38: 586-587, 1939.
- GAILLARDOT-BEY, Charles. (1814-1883). Chevrolat, A., Ann. Soc. Ent. France, (6) 3, (Bull.): cx, 1883.

- GAIMARD, Joseph Paul. (1793-1858). Musgrave, A., *Bib. Austr. Ent.*, p. 117, 1932.
- GALLARDO, Angel. (1867-1934). Doello-Jurado, M., *Ent. News*, 45: 258, 1934; *A., Boll. Soc. Ent. Ital.*, 66: 182, 1934; Bruch, C., *B., P., Rev. Soc. Ent. Arg.*, 6: 235-242, 1934; *A., Arb. morph. taxon. Ent. Berlin-Dahlem*, 1: 309, 1934; Barabino, S. E., *B., Anal. Soc. Cient. Arg.*, 93: 214-220, 1922.
- GANGLBAUER, Ludwig. (1856-1912). *A., P., Ent. Mo. Mag.*, 48: 217-218, 1912; *A., Ent. News*, 23: 435-436, 1912; Morice, F. D., *Trans. Ent. Soc. Lon. (Proc.)*: clxii-clxiii, 1912; Hubenthal, W., *P., Ent. Blätter*, 8: 193-196, 1912; Csiki, E., *Rovart. Lapok (Hung.)*, 19: 122-123, 1912; Soldanski, H., *Deutsche Ent. Ztschr.*, p. 474, 1912; *A., Wien. Ent. Zeit.*, 31: 194, 1912; Spaeth, F., et al., *B., P., Wien. Ent. Zeit.*, 32: 1-15, 1913; Dittrich, R., *Jahresh. Ver. Schles. Insektenk. Breslau*, 6: xxv-xxvii, 1913; Heikertinger, F., *Wien. Ent. Zeit.*, 33: 131-139, 1914; Semenov-Tian-Shanskij, A., *P., Rev. Russe Ent.*, 12: xciv-xcix, 1912; *A., B., Schmid & Thesing's Biologen-Kalender*, 1: 358-359, 1914.
- GARBE, Ernst Wilhelm. (1853-1925). Dö, A., *Rev. Mus. Paulista*, 17: 567-570, 1931; Taunay, A. de E., *P., Rev. Mus. Paulista*, 14: 677-681, 1926.
- GARDNER, John. (1842-1921). "H. S. W.", *Ent. Record*, 33: 164, 1921; "M. L. T.", *Ent. Mo. Mag.*, 57: 236-237, 1921; Corder, J. W., *Entomologist*, 54: 248, 1921; Rothschild, L. W., *Trans. Ent. Soc. Lond. (Proc.)*: cxxix, 1921.
- GARNEYS, William. (1831-1881). Carrington, J. T., *Entomologist*, 14: 302, 1881.
- GARRETA, Léon. (1887-1914). Berland, L., *B., P., Ann. Soc. Ent. France*, 89: 425-427, 1920; Alluaud, C., *Bull. Soc. Ent. France*, p. 457, 1914; *A., Science. n. s.*, 41: 164, 1915.
- GASPERINI, Ferdinand de. (1791-1833). *A., Ann. Soc. Ent. France*, 3 (Bull.): lxxii, 1834.
- GASSNER, Ignaz. (1806-1890). Reitter, E., *Wiener Ent. Zeit.*, 9: 184, 1890.
- GASTALDI, Bartolemo. (1818-1879). *A., Zool. Anzeiger*, 2: 216, 1879; Seller, Q., *B., Atti Accad. Lincei*, (3) 3: 82-92, 1879.
- GAULLE, Jules de. ( -1922). Joannis, J. de, *Bull. Soc. Ent. France*, pp. 281-283, 1922.
- GAUTARD, Victor de. ( -1870). *A., Pet. Nouv. Ent.*, 3: 117, 1871.
- GAUTIER DES COTTES, Baron. ( -1875). *A., Pet. Nouv. Ent.*, 7: 549-550, 1875.
- GAY, Claudio. (1800-1873). Porter, C. E., *B., P., Rev. Chilena Hist. Nat.*, 6: 109-132, 1902.
- GEDDES, J. Gamble. (1850-1896). *A., B., P., Can. Ent.*, 28: 117-118, 1896; Bethune, C. J. S., *B., Ann. Rpt. Ent. Soc. Ont.*, 27: 111-112, 1896; Osborn, H., *Fragments Ent. Hist.*, p. 140, 1937.
- GEDOELST, Louis M. (1861-1927). Calvert, P. P., *Ent. News*, 38: 262, 1927; Lestage, J. A., *Bull. & Ann. Soc. Ent. Belg.*, 67: 55, 1927; Roubaud, E., *Bull. Soc. Ent. France*, p. 81, 1927; Mesnil, F., *Bull. Soc. Path. Exot.*, 20: 205-206, 1927.
- GEE, Nathaniel Gist. (1876-1937). Graban, A. W., *P., Peking Nat. Hist. Bull.*, 12: 167-168, 1937-38; Hoffmann, W. E., *Lingnan Sci. Journ.*, 17: 97, 1938.
- GENENBAUR, Carl. (1826-1903). Nordenskiöld, Erik, *P., Hist. of Biol.*, pp. 499-504, 1925; Locy, W. A., *P., Story of Biol.*, pp. 229-240, 1925.
- GEHIN, Joseph Jean Baptiste. (1816-1889). Puton, A., *Rev. d'Ent.*, 8: 276, 1889; *A., Ent. Mo. Mag.*, 26: 26, 1890.
- GEHRING, John George. (1857-1932). Hungerford, H. B., *Ann. Ent. Soc. Amer.*, 26: 188, 1933.
- GÉLIN, Henri. (1848-1923). *A., Bull. Soc. Ent. France*, pp. 7-8, 1924.
- GEMMINGER, Max. (1820-1887). *A., Ent. Mo. Mag.*, 24: 92, 1887; Dimmock, G., *Psyche*, 5: 35, 1888; *A., Deutsche Ent. Ztschr.*, 31: 6, 1887.
- GENÉ, Carlo Guiseppe. (1800-1847). Bassi, C. A., *Ann. Soc. Ent. France*, (2) 6: 5-22, 1848; Filippi, F., de, *Antol. Ital.*, Mar., p. 8, 1848; Sismonda, E., *B., Mem. Acad. Sci. Torino*, (2) 11: 1-19, 1851.
- GEOFFROY, Etienne Louis. (1727-1810). Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, p. 253, 1823.
- GEOFFROY, SAINT-HILAIRE, Etienne. (1772-1844). Desmarest, E., *B., Ann. Soc. Ent. France*, (2) 3: 16-18, 1845.

- GEOFFROY SAINT-HILAIRE, Isidore. (1805-1861). *A.*, Amer. Journ. Sci., 33: 149, 1862; Nickles, J., Amer. Journ. Sci., 34: 122-123, 1862.
- GERHARDT, Julius. (1827-1912). Kolbe, W., B., P., Jahresh. Ver. Schles. Insekten. Breslau, 6: xxvii-xxxi, 1913; Hinke, O., B., P., Ent. Blätter, 9: 1-8, 1913.
- GERMAR, Ernst Friedrich. (1786-1853). Fairmaire, L., Ann. Soc. Ent. France, (3) 1: 689-696, 1853; Newman, E., Trans. Ent. Soc. Lond., n. s., 2, (Proc.): 149-150, 1852-53; Swainson, W., Bib. of Zool., p. 199, 1840.
- GERSTAECKER, Carl Eduard Adolph. (1828-1895). *A.*, Ent. Mo. Mag., 31: 221, 1895; *A.*, Ent. News, 6: 272, 1895; Kraatz, G., Deutsche Ent. Ztschr., 39, 8, 1895; Musgrave, A., Bib. Austr. Ent., p. 119, 1932.
- GERVAIS, Francois Louis Paul. (1816-1879). *A.*, Ann. Soc. Ent. France, (5) 9, (Bull.): xxx-xxxi, 1879; *A.*, Amer. Nat., 13: 275-276, 1879; *A.*, Zool. Anzeiger, 2: 144, 1879.
- GESNER, Conrad. (1516-1558). Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., p. 245, 1823.
- GESTRO, Raffaello. (1845-1935). Riley, N. D., Entomologist, 69: 196, 1936; *A.*, Bull. Soc. Ent. France, 41: 217, 1936; Horn, W., Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 224, 1936; *A.*, Boll. Soc. Ent. Ital., 68: 65-66, 1936; Beaux, O. de, B., P., Ann. Mus. Civ. Stor. Nat. Genova, 59, (Suppl.): 1-12, 1936; *A.*, et al., P., Boll. Soc. Ent. Ital. (Suppl.), 67: i-lxiii, 1935; Hedicke, H., Deutsche Ent. Ztschr., p. 88, 1925; Imms, A. D., Proc. Roy. Ent. Soc. Lond., Ser. C, 1: 54, 1937; Invrea, F., B., P., Mem. Soc. Ent. Ital., 17: 241-252, 1939; Musgrave, A., Bib. Austr. Ent., p. 119, 1932.
- GIACOMELLI, Eugenio. ( -1941). *A.*, Rev. Soc. Ent. Argentina, 11: 293, 1942.
- GIANELLI, Giacinto. (1840-1932). Turati, E., B., Mem. Soc. Ent. Ital., 11: 106-108, 1932.
- GIARD, Alfred. (1846-1908). Joannis J. de, Bull. Soc. Ent. France, p. 257, 1908; *A.*, Bull. Classe des Sci. Acad. Roy. Belg., 9-10: 738, 1908; Künckel d'Herculais, J., B., P., Ann. Soc. Ent. France, 81: 237-270, 1912; Caullery, M., Zool. Anzeiger, 33: 624, 1908.
- GIBB, Lachlan. (1852-1922). "A. F. W.", Can. Ent., 54: 167-168, 1922; Adkin, R., Entomologist, 55: 95-96, 1922.
- GIBBONS, Charles. (1841-1927). Musgrave, A., Bib. Austr. Ent., p. 120, 1932.
- GIBBS, Arthur E. (1859-1917). *A.*, Ent. News, 28: 338, 1917; Bethune-Baker, G. E., Ent. Mo. Mag., 53: 91-92, 1917; Turner, H. J., Ent. Record, 29: 91-92, 1917; Rowland-Brown, H., Entomologist, 50, 95, 1917.
- GIBSON, Lester E. (1889-1942). Burgess, A. F., P., Journ. Econ. Ent., 36: 130-131, 1943.
- GIFFARD, Walter M. (1856-1929). Van Duzee, E. P., Pan-Pacific Ent., 6: 46-47, 1929; Jordan, K., Proc. Ent. Soc. Lond., 4: 131, 1930; Howard, L. O., P., Hist. of Applied Ent., p. 411, 1930; Osborn, H., P., Fragments Ent. Hist., 1937.
- GIGLIOLI, Enrico Hillyer. (1845-1909). Rosa, D., B., Bull. Soc. Ent. Ital., 41: 19-27, 1909; Vinciguerra, D., B., P., Ann. Mus. Civ. Stor. Nat. Genova, 44: 479-493, 1909.
- GIGLIO-TOS, Ermanno. (1865-1926). *A.*, Ent. News, 38: 32, 1927; *A.*, Boll. Soc. Ent. Ital., 68: 136, 1926; Zavattari, E., B., P., Mem. Soc. Ent. Ital., 5: 35-41, 1926; Senna, A., Monitore Zool. Ital. Sienna, 37: 237-240, 1926; "A.", Zool. Anzeiger, 68: 272, 1926; Hedicke, H., Deutsche Ent. Ztschr., p. 360, 1926.
- GILBERT, Louise Fitz Randolph. ( -1900). *A.*, Ent. News, 11: 484, 1900.
- GILL, Theodore Nicholas. (1837-1914). *A.*, Ent. News, 25: 432, 1914; *A.*, Science, n. s., 40: 547-550, 1914; Busch, A., et al., B., Proc. Ent. Soc. Wash., 16: 177-178, 1914; Wade, J. S., Proc. Ent. Soc. Wash., 38: 116-117, 1936.
- GILLES, William Setten. (1876-1938). Huggins, H. C., Entomologist, 72: 80, 1939; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 6: 188, 1939.
- GILLET, Joseph. ( -1937). Frennet, L., Bull. & Ann. Soc. Ent. Belg., 77: 165, 1937.
- GILLETTE, Clarence Preston. (1859-1941). List, G. M., P., Journ. Econ. Ent., 34: 129-130, 1941; *A.*, Ent. News, 52: 119, 1941; List, G. M., Science, 93: 202, 1941; Usinger, R. L., Pan-Pacific Ent., 17: 84, 1941; List, G. M., Ann. Ent. Soc.

- Amer., 35: 122, 1942; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., p. 262, 1937.
- GILLIATT, Frederick Courtney. (1889-1938). Kelsall, A., *B.*, Can. Ent., 70: 197-198, 1938.
- GILLOTT, Arthur George Malin. (1868-1927). Riley, N. D., Entomologist, 61: 168, 1928.
- GIMMERTHAL, Benjamin August. (1779-1848). Neese, N., *B.*, Korrespondenzbl. Naturf. Ver. Riga, 3: 117-123, 1849.
- GIRARD, Maurice Jean Auguste. (1822-1886). *A.*, Ent. Mo. Mag., 23: 1886; McLachlan, R., Trans. Ent. Soc. Lond. (Proc.): lxi-lxx, 1886; Poujade, G. A., *B.*, Ann. Soc. Ent. France, (6) 6: 475-480, 1886; *A.*, Naturaliste, 8 (42): 332-333, 1886.
- GIRAUD, Joseph Etienne. (1808-1877). Fairmaire, L., *B.*, *P.*, Ann. Soc. Ent. France, (5) 7: 389-396, 1877.
- GIRAULT, Alexandre Arsène. (1884-1941). Muesebeck, C. F. W., Journ. Econ. Ent., 34: 592, 1941; *A.*, Science, 94: 11, 1941; Calvert, P. P., Ent. News, 52: 268-269, 1941; Muesebeck, C. F. W., Ann. Ent. Soc. Amer., 35: 122-123, 1942; *A.*, Rev. Ent. (Rio de J.), 12: 681, 1941; Girault, A. A., *P.*, Rev. Ent. (Rio de J.), 13: 441-442, 1942.
- GIRSCHNER, Ernst. (1860-1913). Hetschko, A., *B.*, *P.*, Wien. Ent. Zeit., 33: 230-234, 1914.
- GISTEL (or GISTL), Johannes von Nepomuk Franz Xaver. (1803-1873). Strand, E., *B.*, Arch. Naturg., 83 A (11): 124-149, 1917 (1919); Horn, W., Ent. Mitteil., 13: 235-238, 1924; Gistel, J., *B.*, Lexikon der Ent. Welt, pp. 32-34, 78-79, 1846.
- GIUSTINO, Agostino Dodero fu. ( -1937). Horn, W., Arb. morph. taxon. Ent. Berlin-Dahlem, 5: 72, 1938; *A.*, Koleopt. Rundschau, 24: 19, 1938.
- GLANVILLE, M. E. ( -1888). Dimmock, G., Psyche, 5: 156, 1888.
- GLASER, Ludwig. (1818-1898). Glaser, R., *B.*, Ent. Nachr., 24: 217-223, 1898.
- GLEDITSCH, Johann Gottlieb. (1714-1786). *A.*, Schrift. Ges. Nat. Freunde Berlin, 9: 301-314, 1789.
- GLENN, Pressley Adams. (1867-1938). Metcalf, C. L., Journ. Econ. Ent., 31: 463, 1938; Osborn, H., Fragments Ent. Hist., pp. 262-263, 1937.
- GLOVER, Alfred K. ( -1928). Calvert, P. P., Ent. News, 39: 317, 1928.
- GLOVER, Townend. (1812-1883). *A.*, Ann. Rpt. Ent. Soc. Ont., 14: 81, 1883; *A.*, Can. Ent., 15: 178, 1883; Dodge, C. R., Proc. Ent. Soc. Wash., 1: 60, 1886; Dodge, C. R., Proc. Ent. Soc. Wash., 6: 12-13, 1903; Dodge, C. R., Psyche, 4: 115-116, 1883; Dodge, C. R., *B.*, *P.*, U. S. Dept. Agr. Div. Ent. Bull. no. 18, pp. 1-68, 1888; Smith, J. B., *P.*, Pop. Sci. Mo., 76: 475, 1910; Strecker, H., *B.*, Butterflies and Moths of N. A., pp. 229-230, 1878; Walton, W. R., Proc. Ent. Soc. Wash., 23: 87-89, 1921; Riley, C. V., Papilio, 3: 167-168, 1883; Howard, L. O., Ann. Rpt. Smithsn. Inst., p. 389, 1930; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., 1937.
- GMELIN, Johann Friedrich. (1748-1804). Swainson, W., Bib. of Zool., p. 200, 1840; Musgrave, A., Bib. Austr. Ent., p. 126, 1932.
- GODART, Jean Baptiste. (1775-1825). Duponchel, P. A. J., Hist. Nat. Lepid. France, 6: 5-10, 1826; Swainson, W., Bib. of Zool., pp. 201-202, 1840; Musgrave, A., Bib. Austr. Ent., p. 126, 1932.
- GODFREY, Edward John. ( -1933). *A.*, Journ. Siam Soc. Nat. Hist. Suppl., 9: 264, 1933.
- GODING, Frederic Webster. (1858-1933). *A.*, Ent. News, 44: 196, 1933; *A.*, Ent. News, 45: 286, 1934; Olsen, C. E., *B.*, Journ. N. Y. Ent. Soc., 42: 443-449, 1934; Musgrave, A., Bib. Austr. Ent., p. 126, 1932; Campos, F., *B.*, *P.*, Rev. Col. Nac. Vicente Rocafructe, 5: 16-19, 1921; Howard, L. O., *P.*, Hist. of Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., p. 233, 1937.
- GODMAN, Frederick DuCane. (1834-1919). Autobiography, *P.*, Biol. Centr.-Amer., 1: 1-12, 1915; Autobiography, *P.*, Jubilee Suppl. Ibis, 2: 81-92, 1909; Calvert, P. P., *P.*, Ent. News, 30: 121-123, 1919; Champion, G. C., Ent. Mo. Mag., 55: 89-91, 1919; Bethune-Baker, G. T., Ent. Record, 31: 99-100, 1919; Rowland-Brown, H., Entomologist, 52: 71-72, 1919; Walsingham, T. de G., Ent. Record, 31: 173-174, 1919; Walsingham, T. de G., Trans. Ent. Soc. Lond., (Proc.): iii-v, 1919;



- Poulton, E. B., *Proc. Linn. Soc. Lond.*, pp. 54-55, 1918-19; *A., Cent. Hist. Ent. Soc. Lond.*, pp. 153-154, 1933; Oberthür, C., *Études Léop. Comp.*, 10 (Plates): unpagéd, 1915; Osborn, H., *Fragments Ent. Hist.*, p. 173, 1937.
- GODRON, Dominique Alexandre. (1807-1880). Bonnet, C., *B., Naturaliste*, 2: 310-311, 1880.
- GOEDART, Johann. (1620-1668). Swainson, W., *Bib. of Zool.*, pp. 202-203, 1840; Snelleman, H. P., *Album der Natuur*, pp. 203-212, 1877; Snellen van Vollenhoven, S. C., *Album der Natuur*, pp. 307-318, 1877; Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, p. 244, 1823; Howard, L. O., *P., Hist. Applied Ent.*, 1930.
- GOELDI, Emilio Augusto. (1859-1917). *A., Ent. News*, 29: 80, 1918; *A., Bull. Soc. Ent. France*, p. 229, 1917; Vaz, Z., *Bol. Biol.*, (S. Paulo), 2: 3-16, 1934; Hedicke, H., *Deutsche Ent. Ztschr.*, p. 192, 1918; Howard, L. O., *P., Hist. of Applied Ent.*, 1930.
- GOETHE, Johann Wolfgang. (1749-1832). Nordenskiöld, Erik, *P., Hist. of Biol.*, pp. 279-285, 1935.
- GOETSCHMANN, Theodor. (1852-1912). Dittrich, R., *Jahresh. Ver. Schles. Insekten. Breslau*, 5: xxii-xxv, 1912.
- GOODMAN, Oliver Richardson. (1877-1929). Grosvenor, T. H. L., *Ent. Mo. Mag.*, 65: 46, 1929; Turner, H. J., *Ent. Record*, 41: 52, 1929.
- GOODSIR, John. (1814-1867). *A., Proc. Roy. Soc. Lond.*, 16: xiv-xvi, 1867-68.
- GOODWIN, Edward. (1867-1934). Frohawk, F. W., *Entomologist*, 68: 48, 1935.
- GOOSSENS, Théodore. (1827-1889). Mabille, P., *Ann. Soc. Ent. France*, (6) 9: 499-500, 1889.
- GORGAS, William Crawford. (1854-1920). *A., Military Surgeon*, 56: 366-370, 1925; *A., Nat. Hist.*, 20: 335, 1920; Gorgas, M. D., and Hendricks, B. J., *World's Work*, 47: 389-398, 503-509, 631-642, 1923; 48: 94-103, 1924; Martin, F., *P., Gorgas Memorial Inst.*, Chicago, pp. 1-76, 1924; Noble, R. E., *P., Ann. Rpt. Smithsonian. Inst.* 1921, pp. 615-624, 1922; Saunders, W. H., *P., 66th Cong. 3d Sess.*, Sen. Doc. no. 390, pp. 1-65, 1921; Siler, J. F., *Amer. Journ. Trop. Med.*, 2: 161-171, 1922; Howard, L. O., *P., Hist. of Applied Ent.*, 1930; Osborn, H., *P., Fragments Ent. Hist.*, 1937.
- GORHAM, Henry Stephen. (1839-1920). *A., Ent. News*, 31: 210, 1920; Tomlin, J. R. le B., *Ent. Mo. Mag.*, 56: 112-113, 1920; Musgrave, A., *Bib. Austr. Ent.*, p. 127, 1932; Walker, J. J., *Trans. Ent. Soc. Lond.*, (Proc.): cviii-cix, 1920.
- GORY, Hippolyte Louis. ( -1852). Westwood, J. O., *Trans. Ent. Soc. Lond.*, (2) 2, (Proc.): 53, 1852-53; *A., Ann. Soc. Ent. France*, (2) 10, (Bull.): xxvii, 1852.
- Goss, Herbert. ( -1908). Walker, J. J., *Ent. Mo. Mag.*, 44: 92, 1908; Rowland-Brown, H., *Entomologist*, 41: 74-75, 1908; *A., Ent. Record*, 20: 70-71, 1908; Horn, W., *Deutsche Ent. Ztschr.*, p. 428, 1908.
- GOSSARD, Harry Arthur. (1868-1925). *A., Ent. News*, 37: 64, 1925; Howard, L. O., et al., *Bimo. Bull. Ohio Agr. Exp. Sta.*, 11: 42, 1926; Howard, L. O., et al., *P., Ann. Ent. Soc. Amer.*, 19: 255-257, 1926; Osborn, H., et al., *P., Journ. Econ. Ent.*, 19: 194-199, 1926; Osborn, H., *P., Fragments Ent. Hist.*, p. 189, 1937.
- GOSSE, Philip Henry. (1810-1888). *A., Ent. Mo. Mag.*, 25: 113-114, 1888; Fyles, T. W., *Ann. Rpt. Ent. Soc. Ont.*, 19: 37, 1888; Fyles, T. W., *Ann. Rpt. Ent. Soc. Ont.*, 23: 22-29, 1892; Fyles, T. W., *Can. Ent.*, 21: 17-19, 1889; "H. B. B.", *Proc. Roy. Soc. Lond.*, 44: xxvii-xxviii, 1888.
- GÖTSCHMANN, Theodor. (1850-1912). *A., Deutsche Ent. Ztschr.*, p. 608, 1912.
- GOUGELET, Jean Scipion. (1798-1872). Desmarest, E., *Ann. Soc. Ent. France*, (5) 2: 511-512, 1872; *A., Pet. Nouv. Ent.*, 4: 272, 1872.
- GOULD, Augustus Addison. (1805-1866). Wyman, J., *B., Proc. Bost. Soc. Nat. Hist.*, 11: 188-205, 1866-68; Crosse, H., et al., *Journ. Conchyl.*, 15: 96, 1867; Tryon, G. W., Jr., *Amer. Journ. Conchyl.*, 3: 106-107, 1867; *P. only*, l. c., 1: opp. p. 287, 1865; Dall, W. H., *Proc. Biol. Soc. Wash.*, 4: 120-122, 1888; Wyman, J., *B., P., Wash. Nat. Acad. Sci. Biog. Mem.*, 5: 91-113, 1905; *A., Amer. Journ. Sci.*, (2) 42: 434-435, 1866; *A., Proc. Amer. Arts & Sci.*, 7: 300-304, 1865-68.
- GOULD, John. (1804-1881). Musgrave, A., *Bib. Austr. Ent.*, p. 128, 1932.
- GOUNELLE, Pierre Emile. (1850-1914). *A., Bull. Soc. Ent. France*, p. 435, 1914; *A.,*



- Ent. News, 26: 192, 1915; Millot, A., B., P., Ann. Soc. Ent. France, 89: 109-112, 1920; A., Miscellanea Ent., 22 (10): 50, 1915.
- GOUREAU, Claude Charles. (1790-1879). Miot, H., B., Ann. Soc. Ent. France, (5) 9: 389-400, 1879; A., Naturaliste, 1: 2, 1879; Stainton, H. T., Ent. Mo. Mag., 16: 46, 1879; A., Deutsche Ent. Ztschr., 23: 8, 1879.
- GOWDEY, Carlton Craig. ( -1928). A., Tropical Agr., 5 (5): 127, 1928.
- GRAEF, Edward Louis. (1842-1922). A., Ent. News, 33: 320, 1922; Engelhardt, G. P., P., Bull. Bklyn. Ent. Soc., 17: 43-45, 1922; Osborn, H., Fragments Ent. Hist., p. 143, 1937.
- GRAENICHER, Sigmund. (1855-1937). Cockerell, T. D. A., Science, 86: 364-365, 1937; Mickel, C. E., Ann. Ent. Soc. Amer., 31: 120, 1938.
- GRÄFFE, Eduard. (1833-1916). Soldanski, H., B., Deutsche Ent. Ztschr., p. 605, 1916.
- GRAMANN, August. (1876-1936). "R. W.", P., Mitt. Schweiz. Ent. Ges., 17: 186-187, 1937.
- GRANT, Charles E. (1850-1936). A., Can. Ent., 68: 212, 1936; A., Ann. Rpt. Ent. Soc. Ont., 67: 5, 1937.
- GRAPENTIEN, Hugo. (1860-1935). "A. S.", P., Mitt. Schweiz. Ent. Ges., 16: 611-612, 1935.
- GRASLIN, Adolphe de. (1802-1882). Mabille, P., B., Ann. Soc. Ent. France, (6) 3: 561-564, 1883; Reiche, L., Ann. Soc. Ent. France, (6) 2, (Bull.): cix, 1882; A., B., Abeille, 26: 279-280, 1889.
- GRASSI, Giovanni Battista. (1854-1925). A., Ent. News, 36: 224, 1925; A., Ent. News, 37: 127-128, 1926; Masi, L., Bull. Soc. Ent. Ital., 57: 81, 1925; "E. S. G.", Proc. Linn. Soc. Lond., pp. 85-86, 1926-27; Howard, L. O., P., Hist. of Applied Ent., 1930.
- GRAY, George Robert. (1808-1872). A., Ent. Mo. Mag., 9: 23-24, 1872-73; A., Proc. Linn. Soc. Lond., pp. lxii-lxiv, 1871-72; A., Amer. Journ. Sci., (3) 4: 160, 1872; "N.", Zool. Garten, 13: 160, 1872; Musgrave, A., Bib. Austr. Ent., pp. 128-129, 1932; Westwood, J. O., Trans. Ent. Soc. Lond. (Proc.): xlix-l, 1872; Newman, E., Entomologist, 6: 128, 1872.
- GRAY, John Edward. (1800-1875). A., Journ. Zool., 4: 96-97, 1875; A., Ent. Mo. Mag., 11: 262-263, 1875; Newman, E., Entomologist, 8: 93-96, 1875; A., Proc. Linn. Soc. Lond., pp. xliii-xlvii, 1874-75; A., Ibis, (3) 5: 525, 1875; A., Journ. Conchyl., (3) 16: 132-133, 1876; A., Leopoldina, 11: 54-55, 1875; A., Amer. Journ. Sci., (3) 10: 77-80, 239, 1875; Newman, E., Zoologist, (2) 10: 4466-4468, 1875; A., Nature, 11: 368, 1875.
- GREDLER, Vinzenz Maria. (1823-1912). Dalla Torre, K. W., von, Ent. Blätter, 8: 145-147, 1912; Ohaus, F., Deutsche Ent. Ztschr., pp. 375-376, 1912; A., Wien. Ent. Zeit., 31: 256, 1912.
- GREENING, Linnaeus. (1855-1927). Dallman, A. A., Proc. Linn. Soc. Lond., pp. 118-119, 1927-28.
- GREER, Albert H. (1891-1943). Lyle, C., Ann. Ent. Soc. Amer., 37: 132, 1944.
- GREGSON, Charles Stuart. (1817-1899). "E. M. M.", Entomologist, 32: 144, 1899; A., Ent. Mo. Mag., 35: 96-97, 1899; A., Ent. Record, 11: 81, 1899.
- GREINER, Johann. (1863-1938). A., Arb. morph. taxon. Ent. Berlin-Dahlem, 6: 69, 1939.
- GRENIER, A. (1814-1890). Bonvouloir, H. de, P., Ann. Soc. Ent. France, (6) 10: 563-566, 1890.
- GRENTZENBERG, Robert. (1823-1886). A., Berl. Ent. Ztschr., 30: 330, 1886.
- GREW, Nehemiah. (1641-1712). Locy, W. A., P., Story of Biol., pp. 382-389, 1925.
- GREY, Thomas de. (See Walsingham).
- GREY, William. (1827-1896). A., Ent. News, 9: 32, 1897.
- GRIBODO, Giovanni. (1846-1924). Porter, C. E., Rev. Chilena Hist. Nat., 30: 340, 1926; Invrea, F. B., Mem. Soc. Ent. Ital., 4: 223-228, 1925; A., Boll. Soc. Ent. Ital., 56: 113, 1924.
- GRIFFINI, Achille. ( -1932). A., Boll. Soc. Ent. Ital., 64: 109, 1932.
- GRIFFITHS, George Charles. (1852-1924). A., Ent. News, 36: 222, 1925; Bartlett, C., Entomologist, 58: 71-72, 1925.
- GRILL, Claes. (1851-1919). Trägårdh, I., B., P., Ent. Tidskr., 41: 41-45, 1920.

- GRIMES, Dillard Wister. (1891-1943). Lyle, C., *Journ. Econ. Ent.*, 36: 359, 1943.
- GROSSBECK, John Arthur. (1883-1914). *A.*, *Ent. News*, 25: 288, 1914; *A.*, *Journ. N. Y. Ent. Soc.*, 22: 175, 1914; Davis, W. T., *B.*, *P.*, *Journ. N. Y. Ent. Soc.*, 22: 271-275, 1914; Lutz, F. E., *Ann. Ent. Soc. Amer.*, 8: 101, 1915; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 206, 1937.
- GROSVENOR, George Herbert. (1880-1912). *A.*, *Ent. News*, 23: 436, 1912; *A.*, *Ent. Mo. Mag.*, 48: 243-244, 1912; Eltringham, H., *Ent. Record*, 24: 252, 1912; Morice, F., D., *Trans. Ent. Soc. Lond.*, (Proc.): clxv-clxvi, 1912.
- GROTE, August Radcliffe. (1841-1903). *A.*, *Ann. Rpt. Ent. Soc. Ont.*, 25: 1, 1894; *A.*, *Can. Ent.*, 35: 294, 1903; *A.*, *Ent. Mo. Mag.*, 39: 256, 1903; *A.*, *Ent. News*, 14: 277-278, 1903; Bethune, C. J. S., *Ann. Rpt. Ent. Soc. Ont.*, 34: 109-112, 1903; Bethune, C. J. S., *P.*, *Can. Ent.*, 27: 1, 1895; Bode, W., *B.*, *P.*, *Allg. Ztschr. Ent.*, 9: 1-6, 1904; Graef, E. L., *Bull. Bklyn. Ent. Soc.*, 9: 47-56, 1914; Milburn, J. G., *Ent. News*, 24: 182-183, 1913; Smith, J. B., *P.*, *Pop. Sci. Mo.*, 76: 471, 1910; Strecker, H., *B.*, *Butterflies and Moths of N. A.*, pp. 232-236, 1878; *A.*, *Leopoldina*, 39: 132, 1903; Howland, H. R., *P.*, *Bull. Buffalo Soc. Nat. Sci.*, 8 (6): 10-14, 1907; Kusnezov, N. I., *Rev. Russe Ent.*, 3: 344-345, 1903; Howard, L. O., *P.*, *Hist. Applied Ent.*, 1930; Essig, E. O., *B.*, *P.*, *Hist. of Ent.*, pp. 639-640, 1931; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 142, 1937.
- GROUVELLE, Antoine Henri. (1843-1917). *A.*, *Bull. Soc. Ent. France*, pp. 181-182, 1917; *A.*, *Ent. News*, 29: 80, 1918; *A.*, *Ent. News*, 35: 303, 1924; Arrow, G. J., *Ent. Mo. Mag.*, 53: 185, 1917; Musgrave A., *Bib. Austr. Ent.*, pp. 131-132, 1932; Desbordes, H., *B.*, *P.*, *Ann. Soc. Ent. France*, 88: 345-360, 1919.
- GRUBE, Adolphe Edouard. (1812-1880). *A.*, *Naturaliste*, 2: 296, 1880; *A.*, *B.*, *Leopoldina*, 16: 96, 114-117, 1880.
- GRUNACK, Albert. (1842-1907). *A.*, *P.*, *Insektenbörse*, 24: 123, 1907.
- GRUNDELL, Julius George. (1857-1933). Van Dyke, E. C., *Pan-Pacific Ent.*, 10: 48, 1934.
- GRZEGORZEK, Adalbert. (1819-1890). Mik, J., *B.*, *Wien. Ent. Zeit.*, 9: 160, 1890.
- GUDMANN, Frederik Carl Julius Emil. (1869-1932). Kryger, J. P., *B.*, *P.*, *Ent. Meddel.* (Copenhagen), 18: 415-420, 1933-34.
- GUÉNEE, Achille. (1809-1880). *A.*, *Ent. Mo. Mag.*, 17: 214-216, 1881; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 132-133, 1932; *A.*, *Naturaliste*, 3: 351, 1880; Fitch, E. A., *Entomologist*, 14: 48, 1881; Kraatz, G., *Deutsche Ent. Ztschr.*, 25: 339, 1881; *A.*, *Ent. Nachr.*, 7: 68, 1881; *A.*, *Amer. Nat.*, 15: 261, 1881; Essig, E. O., *P.*, *Hist. of Ent.*, pp. 641-642, 1931; Grote, A. R., *Papilo*, 1: 31-33, 1881.
- GUÉRIN-MÉNEVILLE, Félix Edouard. (1799-1874). Chevrolat, A., *B.*, *Ann. Soc. Ent. France* (5) 4: 5-8, 1874; Leprieux, C. E., *Ann. Soc. Ent. France* (5) 4, (Bull.): xiv-xvi, 1874; *A.*, *Ent. Mo. Mag.*, 10: 233-234, 1874; *A.*, *Journ. Conchyl.*, 23: 95-96, 1875; *A.*, *Pet. Nouv. Ent.*, 6 (92): 372, 1874; *A.*, *Journ. de Zool.*, 3: 47-48, 1874; *A.*, *Annuaire Ent.*, 3: 117-120, 1875.
- GUIGNON, Chanoine. (1856-1933). *A.*, *Lambillionea*, 34: 25, 1934.
- GUILLEBEAU, Francisque. (1821-1897). Abeille de Perrin, E., *Ann. Soc. Ent. France*, 72: 353-357, 1903; Grouvelle, A., *Bull. Soc. Ent. France*, pp. 233, 305, 1897; Xambeau, V., *Echange*, 13: 81-83, 1897; Carrett, A., *Echange*, 14: 58-60, 75-76, 83-84, 91-92, 99-100, 1898; 15: 7-8, 13-16, 29-32, 37-40, 43-44, 49-52, 61-64, 67-68, 77-80, 83-84, 93-96, 1899.
- GUITERAS, Juan. (1852-1925). Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930.
- GULDE, Johannes. (1872-1929). Sack, P., *Ent. Ztschr.*, Frankfurt, 43: 145-146, 1929.
- GUNDLACH, Juan (Johannes Christopher). (1810-1896). *A.*, *Leopoldina*, 32: 101, 1896; *A.*, *Arch. Path. Anat.*, 148: 182, 1897; *A.*, *Ent. News*, 7: 128, 1896; Ramsden, C. T., *B.*, *P.*, *Ent. News*, 26: 241-260, 1915; Bartsch, P. W., *P.*, *Explor. & Field Work Smithsn. Inst.*, 1928, pp. 77-79, 82, 1929; Osborn, H., *P.*, *Fragments Ent. Hist.*, pp. 31-32, 1937.
- GURLT, Ernst Friedrich. (1794-1882). *A.*, *Leopoldina*, 18: 159, 1882.
- GURNEY, William Butler. (1882-1939). Holmes, J. M., *Proc. Linn. Soc. N. S. W.*, 65: i-ii, 1940.
- GUTHRIE, Joseph Edward. (1871-1935). *A.*, *B.*, *P.*, *Proc. Iowa Acad. Sci.*, 42: 21-24, 1935; Osborn, P., *Fragments Ent. Hist.*, p. 222, 1937.

- GYLLENHAL, Leonhard. (1752-1840). *A.*, Stett. Ent. Zeit., 1: 111-112, 1840; Guitel, F., *P.*, *Insecta*, 4: 35-36, 1914; *A.*, *B.*, Kongl. Svenska Vetensk. Acad. Handl. 1840, pp. 239-245, 1842; Musgrave, A., *Bib. Austr. Ent.*, p. 137, 1932; Swainson, W., *Bib. of Zool.*, p. 208, 1840; Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, p. 266, 1823; Silbermann, G., *Revue Ent.*, 5: 351, 1837 (1840); Dow, R. P., *Bull. Bklyn. Ent. Soc.*, 8: 70, 1913.
- HAAG-RUTENBERG, Johann Georg. (1830-1879). Fitch, E. A., *Entomologist*, 13: 120, 1880; Kraatz, G., *B.*, *Deutsche Ent. Ztschr.*, 24: 231-235, 1880; Dohrn, C. A., *Stett. Ent. Zeit.*, 41: 111-113, 1880; *A.*, *Naturaliste*, 1: 148, 1879; Musgrave, A., *Bib. Austr. Ent.*, p. 137, 1932.
- HAASE, Erich. (1867-1894). Steinert, H., *Iris*, 7: 364-366, 1894; Mik, J., *Wien. Ent. Zeit.*, 13: 234, 1894.
- HAEGERLE, Rowland Wells. (1892-1940). Shull, W. E., *Journ. Econ. Ent.*, 33: 708, 1940.
- HACKWITZ, Gustaf Olof David von. (1838-1914). Kemner, N. A., *P.*, *Ent. Tidskr.*, 36: 74-75, 1915.
- HAGEDORN, Julius Max. (1852-1914). *A.*, *Ent. News*, 26: 384, 1915; *A.*, *Deutsche Ent. Ztschr.*, p. 213, 1915; Musgrave, A., *Bib. Austr. Ent.*, p. 138, 1932; *A.*, *Ent. Blätter*, 11: 191, 1915.
- HAGEN, Hermann August. (1817-1893). *A.*, *Amer. Nat.*, 28: 95-96, 1894; *A.*, *Can. Ent.*, 25: 328, 1893; *A.*, *P.*, *Harvard Book*, 1: 345-346, 1874; *A.*, *Insect Life*, 6: 280-281, 1894; *A.*, *Psyche*, 7: 35, 1894; Calvert, P. P., *P.*, *Ent. News*, 4: 313-317, 1893; Henshaw, S., *Ann. Rpt. Ent. Soc. Ont.*, 25: 122-124, 1894; Henshaw, S., *P.*, *Proc. Amer. Acad. Arts & Sci.*, 29: 419-423, 1894; McLachlan, R., *Ent. Mo. Mag.*, 30: 18-20, 1894; Seidlitz, G., von, *P.*, *Deutsche Ent. Ztschr.*, 38: 323-325, 1894; Smith, J. B., *P.*, *Pop. Sci. Mo.*, 76: 472-473, 1910; Musgrave, A., *Bib. Austr. Ent.*, p. 138, 1932; Kraatz, G., *Deutsche Ent. Ztschr.*, 38: 9, 1894; Osten Sacken, C. R., *Record of my Life and Work in Entomology*, pp. 74-77, 1903; Seidlitz, G., von, et al., *Wien. Ent. Zeit.*, 36: 127-128, 1917; Howard, L. O., *Hist. Applied Ent.*, 1930; Essig, E. O., *P.*, *Hist. of Ent.*, pp. 643-646, 1931; Osborn, H., *P.*, *Fragments Ent. Hist.*, pp. 159-161, 1937.
- HAGGART, James Crerar. (1874-1934). Williams, H. B., *Ent. Record*, 47: 11, 1935.
- HAHN, Jaroslav. (1897-1933). *A.*, *B.*, *Acta Soc. Ent. Cechosl.*, 30: 11, 1933.
- HAIJ, Julius Bernhard. (1859-1920). Bengtsson, S., *B.*, *P.*, *Ent. Tidskr.*, 42: 120-124, 1921.
- HAIMBACH, Frank. (1859-1930). Williams, R. C., et al., *B.*, *P.*, *Ent. News*, 41: 281-284, 1930.
- HALDEMAN, Samuel Stehman. (1812-1880). *A.*, *Proc. Amer. Acad. Arts & Sci.*, 16: 456-457, 1881; *A.*, *Amer. Nat.*, 14: 755-756, 1880; *A.*, *Can. Ent.*, 12: 220, 1880; *A.*, *P.*, *Ent. News*, 23: 1, 1912; *A.*, *P.*, *Nat. Cyclop. Amer. Biog.*, 9: 246, 1907; *A.*, *P.*, *Pop. Sci. Mo.*, 21: 395-401, 1882; Brinton, D. G., *Proc. Amer. Phil. Soc.*, 19: 279-285, 1882; Dall, W. H., *Proc. Biol. Soc. Wash.*, 4: 112-113, 1888; Lesley, J. P., *Nat. Acad. Sci. Biog. Mem.*, 2: 139-172, 1886; Morris, J. G., *Ann. Rpt. Ent. Soc. Ont.*, 12: 14-17, 1881; Morris, J. G., *Can. Ent.*, 13: 184-186, 1881; Smith, J. B., *P.*, *Pop. Sci. Mo.*, 76: 469, 1910; Weiss, H. B., *Journ. N. Y. Ent. Soc.*, 46: 45-48, 1938; *A.*, *Naturaliste*, 2: 303, 1880; Geiser, S. W., *Naturalists of the Frontier*, p. 324, 1937; Howard, L. O., *Hist. Applied Ent.*, 1930; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 27, 1937; Essig, E. O., *P.*, *Hist. of Ent.*, pp. 646-647, 1931.
- HALIDAY, Alexander Henry. (1807-1870). *A.*, *Ent. Mo. Mag.*, 7: 91, 1870; *A.*, Abeille, 7, (Nouv. et Faites): lxxv-lxxvi, 1870; *A.*, *Proc. Linn. Soc. Lond.*, pp. lxxxvii-lxxxviii, 1870-71; *A.*, *Amer. Journ. Sci.*, (2) 50: 294, 1870; *A.*, *B.*, *P.*, *Irish Nat.*, 11: 197-199, 1902; *A.*, *Cent. Hist. Ent. Soc. Lond.*, p. 134, 1933; *A.*, *Nature*, 2: 240, 1870; Kraatz, G., *Berlin. Ent. Ztschr.*, 14: x, 1870; Osten Sacken, C. R., *P.*, *Record of my life and work in entomology*, pp. 51-62, 1903; Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930.

- HALL, Maurice Crowther. (1881-1938). Chapin, E. A., et al., *P.*, Proc. Ent. Soc. Wash., 40: 147-149, 1938.
- HALLER, Albrecht von. (1708-1777). Locy, W. A., *P.*, Story of Biol., pp. 440-444, 1925; Nordenskiöld, Erik, *P.*, Hist. of Biol., pp. 234-238, 1935; Müller, K., *P.*, Natur, 8: 369-371, 387-390, 402-412, 1859; Fée, A. L. A., Mem. Soc. Sci. Lille, 1: 92-126, 1831 (1832).
- HALLER, Gustav. ( -1886). Dimmock, G., Psyche, 5: 35, 1888; *A.*, Zool. Anzeiger, 9: 600, 1886; *A.*, Ent. Amer., 2: 101, 1886.
- HALLINEN, Joseph Edward. (1859-1932). Hungerford, H. B., Ann. Ent. Soc. Amer., 27: 122, 1934.
- HAMER, James. (1841-1887). Dimmock, G., Psyche, 5: 35, 1888.
- HAMILTON, John. (1827-1897). *A.*, Ent. Mo. Mag., 33: 108, 1897; *A.*, *P.*, Ent. News, 8: 73-74, 1897; Osborn, H., Fragments Ent. Hist., p. 144, 1937; Klages, E. A., *B.*, Trans. Amer. Ent. Soc., 37: 361-367, 1911.
- HAMLIN, John Calhoun. (1896-1943). Walton, W. R., *P.*, Journ. Econ. Ent., 36: 812, 1943; Osborn, H., Fragments Ent. Hist., p. 264, 1937; Douglass, J. C., Ann. Ent. Soc. Amer., 37: 132-133, 1944.
- HAMMAR, Alfred Gottlieb. (1880-1913). *A.*, Ent. News, 25: 240, 1914; Comstock, J. H., et al., Ent. News, 24: 480, 1913; Quaintance, A. L., Proc. Ent. Soc. Wash., 16: 8, 1914; Riley, W. A., Journ. Econ. Ent., 7: 155-157, 1914; Osborn, H., Fragments Ent. Hist., p. 215, 1937.
- HAMPE, Clemens. (1802-1884). Reitter, E., *P.*, Wien. Ent. Zeit., 4: 1-2, 1885.
- HAMPSON, George Francis. (1860-1936). Imms, A. D., Proc. Roy. Ent. Soc. Lond., ser. C, 1: 55-56, 1937; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 160, 1937; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 140-142, 1932; Riley, N. D., Nature, 138: 712, 831, 1936; Bird, H., Epic of Papaipema, vol. 2, pp. 87-91, 197-198 (not yet published) (Amer. Mus. Nat. Hist.).
- HANBURY, Daniel. (1825-1875). Behn, W. F. G., Leopoldina, 13: 1, 1877.
- HANBURY, Frederick Janson. (1851-1875). Edelsten, H. M., Entomologist, 71: 120, 1938; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 5: 296, 1938; Wallis, T. E., Proc. Linn. Soc. Lond., pp. 318-319, 1938-39.
- HANCOCK, Joseph Lane. (1864-1922). *A.*, New York Times, 71: (23, 424.), 15, Mar. 13, 1922; Hebard, M., Ent. News, 33: 160, 1922; Osborn, H., *P.*, Fragments Ent. Hist., p. 231, 1937.
- HANDLIRSCH, Adam. (1864-1890). Mik, J., et al., Wien. Ent. Zeit., 9: 104, 1890.
- HANDLIRSCH, Anton. (1865-1935). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 2: 308, 1935; Beier, M., *B.*, *P.*, Konowia, 14: 340-349, 1935; Calvert, P. P., Ent. News, 47: 168-169, 1936; Beier, M., *P.*, Ann. naturh. Mus. Wien, 49: (73)-(74), 1938; Beier, M., *P.*, Ent. Blätter, 32: 177-178, 1936; Beier, M., *P.*, Verh. zool.-bot. Ges. Wien., 86-87: 438-440, 1936-37; Heikertinger, F., Koleopt. Rundschau, 21: 236-237, 1935.
- HANSEN, Hans Jacob. (1855-1936). Calman, W. T., Proc. Linn. Soc. Lond., pp. 193-195, 1936-37; Henriksen, K. L., *P.*, Ent. Meddel. (Copenhagen), 20: 29-31, 1937.
- HANSEN, James. (1874-1934). Hungerford, H. B., Ann. Ent. Soc. Amer., 29: 184, 1936.
- HARBISON, John Stewart. (1826-1912). Essig, E. O., *P.*, Hist. of Ent., pp. 647-649, 1931.
- HAROLD, Edgar von. (1830-1886). Fairmaire, L., Ann. Soc. Ent. France, (6) 7: 47-48, 1887; *A.*, Ent. Mo. Mag., 23: 113-114, 1886; Kraatz, G., Deutsche Ent. Ztschr., 30: 17, 1886; Reitter, E., Wien. Ent. Zeit., 5: 256, 1886; *A.*, Berl. Ent. Ztschr., 30: 149-150, 1886; Musgrave, A., *B.*, Bib. Austr. Ent., p. 145, 1932; McLachlan, R., Trans. Ent. Soc. Lond., (Proc.), pp. lxx-lxvi, 1886.
- HARRINGTON, William Hague. (1852-1918). *A.*, *P.*, Ann. Rpt. Ent. Soc. Ont., 29: 113, 1898; *A.*, *P.*, Can. Ent., 31: 1, 1899; *A.*, Ent. News, 29: 320, 1918; Gibson, A., *B.*, *P.*, Can. Ent., 50: 181-187, 292, 1918; *A.*, Ann. Rpt. Ent. Soc. Ont., 49: 10-11, 1918; Osborn, H., Fragments Ent. Hist., pp. 145-146, 1937.
- HARRIS, Edward Doubleday. (1839-1919). Leng, C. W., *B.*, *P.*, Journ. N. Y. Ent. Soc., 27: 237-240, 1919; Osborn, H., *P.*, Fragments Ent. Hist., p. 145, 1937.

- HARRIS, Moses. (1731-1781). Weiss, H. B., *Science*, Mo., 23: 560-564, 1926.
- HARRIS, Thaddeus William. (1795-1856). *A., P., Ent. News*, 7: 1, 1896; *A., Proc. Amer. Acad. Arts & Sci.*, 3: 224-225, 1856; *A., Proc. Essex Inst.*, 2: 2-3, 1862; Dow, R., *P., Bull. Bklyn. Ent. Soc.*, 8: 106-118, 1913; Field, W. L. W., *Psyche*, 17: 28, 1910; Grote, A. R., *Ann. Rpt. Ent. Soc. Ont.*, 20: 75-82, 1889; Hagen, H. A., *B., Proc. Bost. Soc. N. H.*, 21: 150-152, 1881; McKenzie, A., *P., New Eng. Mag. n. s.*, 8: 284, 1893; Morris, J. G., *Amer. Journ. Sci.*, 1: 24-27, 1846; Scudder, S. H., *Occas. Papers Bost. Soc. N. H.*, 1: i-xlvi, 1869; Scudder, S. H., *B., P., Proc. Bost. Soc. N. H.*, 7: 72, 213-222, 1860; Scudder, S. H., *Psyche*, 6: 57-60, 121-124, 137-141, 169-172, 185-187, 297-298, 345-346, 357-358; 1891; Smith, J. B., *P., Pop. Sci. Mo.*, 76: 475, 1910; Strecker, H., *B., Butterflies and Moths of N. A.*, pp. 238-240, 1878; Wade, J. S., *Sci. Mo.*, 23: 152-160, 1926; "W. L. W. F.", *Psyche*, 14: 67, 1907; Scudder, S. H., *P.*, (vol. 3), *Butterflies Eastern U. S. & Canada*, 1: 656-658, 1889; Howard, L. O., *P., Hist. Applied Ent.*, 1930; Essig, E. O., *P., Hist. of Ent.*, pp. 651-653, 1931; Osborn, H., *P., Fragments Ent. Hist.*, 1937.
- HARRISON, Albert. (1860-1911). *A., Ent. News*, 23: 48, 1912; Porritt, G. T., *Ent. Mo. Mag.*, 47: 264-265, 1911; Turner, H. J., *Ent. Record*, 23: 282-283, 1911; Morice, F. D., *Trans. Ent. Soc. Lond.*, (Proc.): cxiii-cxxiv, 1911; "B. D. J.", *Proc. Linn. Soc. Lond.*, p. 47, 1911-12.
- HARRISON, Lancelot. (1880-1928). Musgrave, A., *B.*, pp. 145-146, 1932; *A., Nature*, 121: 594, 1928; "J. P. H.", *Nature*, 122: 65-66, 1928; *A., B., P., Austr. Zool.*, 5: 132-137, 1928; Anderson, S., *Austr. Mus. Mag.*, 3: 191-192, 1928; Cabbage, R. H., *Proc. Linn. Soc. N. S. W.*, 53: v-vii, 1928.
- HART, Charles Arthur. (1859-1918). Malloch, J. R., *Ent. News*, 29: 157-159, 1918; Osborn, H., *P., Fragments Ent. Hist.*, p. 237, 1937.
- HART, Esther Hastings. (1862-1940). Walton, W. R., *P., Journ. Econ. Ent.*, 33: 820, 1940.
- HARTIG, Theodor. (1805-1880). Fitch, E. A., *Entomologist*, 13: 192, 1880; *A., Ent. Nachr.*, 6: 151-152, 1880; *A., B., Leopoldina*, 16: 70-71, 1880.
- HARTLEY, Edwin A. (1893-1926). Osborn, H., *P., Fragments Ent. Hist.*, p. 218, 1937.
- HARTWIG, Wilhelm. (1889-1915). Soldanski, H., *Deutsche Ent. Ztschr.*, pp. 1-2, 1916.
- HARVEY, Francis Leroy. (1850-1900). Calvert, P. P., *Ent. News*, 11: 451-452, 1900; Osborn, H., *P., Fragments Ent. History*, 1937.
- HARWOOD, William Henry. (1840-1917). *A., Ent. Mo. Mag.*, 54: 40-41, 1918; *A., Ent. News*, 29: 240, 1918.
- HASWELL, William Aitcheson. (1854-1925). Carter, H. J., *B., P., Proc. Linn. Soc. N. S. Wales*, 53: 485-498, 1928; Musgrave, A., *Bib. Austr. Ent.*, p. 146, 1932; Wilson, J. T., *Proc. Linn. Soc. Lond.*, pp. 74-75, 1924-25; *A., Proc. Linn. Soc. N. S. Wales*, 50: v-viii, 1925; Hill, J. P., *P., Proc. Roy. Soc. Lond.*, (B) 97: xii-xiv, 1924-25.
- HAWKSHAW, John Clarke. (1841-1921). *A., Ent. News*, 32: 192, 1921; Scott, H., *Ent. Mo. Mag.*, 57: 94, 1921.
- HAWORTH, Adrian Hardy. (1767-1833). Swainson, W., *Bib. of Zool.*, p. 385, 1840; Gray, J. E., *Ann. & Mag. N. H.*, (4) 7: 244-245, 1871.
- HAYWARD, Arthur Rusher. (1878-1939). Rippon, C., *Entomologist*, 72: 296, 1939.
- HAYWARD, Harold Carlyle. (1876-1935). Sheldon, W. G., *Entomologist*, 68: 144, 1935.
- HAYWARD, Roland. (1865-1906). *A., Ent. News*, 17: 230, 1906; Henshaw, S., *B., P., Psyche*, 13: 101-103, 1906.
- HEALY, John L. (1864-1926). Wyatt, A. K., *Ent. News*, 37: 128, 1926.
- HEARLE, Eric. (1893-1934). Gibson, A., *Can. Ent.*, 66: 169-171, 1934; Downes, W., *Proc. Ent. Soc. Br. Col.*, 31: 6-7, 1934; *A., Ann. Rpt. Ent. Soc. Ont.*, 65: 5, 1934; Hungerford, H. B., *Ann. Ent. Soc. Amer.*, 28: 179, 1935.
- HEATH, Edwin Firmstone. (1840-1914). "A. F.", *Can. Ent.*, 46: 299-300, 1914.
- HEEGER, Ernst. (—1866). Frauenfeld, G. R. von, *Verh. zool.-bot. Ges. Wien*, 16 (Sitzb.): 102-103, 1866.
- HEER, Oswald. (1809-1883). *A., Ent. Mo. Mag.*, 20: 144, 1883; Scudder, S. H., *P., Science*, 2: 583-586, 1883; Shoch, G., *Mitt. Schweiz. Ent. Ges.*, 6: 694-697, 1884;

- Kolbe, H. J., Berlin. Ent. Ztschr., 28: 213, 1884; *A.*, Wien. Ent. Zeit., 2: 288, 1883.
- HEIDEMANN, Otto. (1842-1916). *A.*, *P.*, Ent. News, 28: 1-2, 1917; *A.*, *P.*, Psyche, 23: 159, 1916; Howard, L. O., *B.*, *P.*, Proc. Ent. Soc. Wash., 18: 201-205, 1916; Walton, W. R., Proc. Ent. Soc. Wash., 23: 94-95, 1921; McAtee, W. L., Proc. Ent. Soc. Wash., 18: 217-218, 1916; Essig, E. O., *P.*, Hist. of Ent., pp. 653-654, 1931; Osborn, H., *P.*, Fragments Ent. Hist., p. 203, 1937.
- HEINEMANN, H. von. ( -1871). Kraatz, G., Berlin Ent. Ztschr., 15: viii-ix, 1871; Newman, E., Entomologist, 6: 32, 1872; Wallace, A. R., Trans. Ent. Soc. Lond., (Proc.); liii, 1871.
- HEINK, Charles L. (1869-1940). Meiners, E. P., Ent. News, 52: 119-120, 1941.
- HEINRICH, Rudolf. (1859-1939). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 6: 69, 1939.
- HEISER, Rudolph. (1839-1905). *A.*, Ent. News, 18: 112, 1907.
- HELLINS, John. (1829-1887). *A.*, Ent. Mo. Mag., 24: 20, 1887.
- HELMHOLTZ, Hermann Ludwig Ferdinand. (1821-1894). "A. W. R.", Proc. Roy. Soc. Lond., 59: xvii-xxx, 1896; Locy, W. A., *P.*, Story of Biol., pp. 460-462, 1925; Nordenskiöld, Erik, Hist. of Biol., pp. 409-410, 1935.
- HELMS, Richard. (1858-1914). Hedley, C., Journ. Proc. Roy. Soc. N. S. W., 49: 11-14, 1915; "W. B. A.", *B.*, Journ. Proc. Roy. Soc. W. Austr., 1: (Proc.), xxviii-xxix, 1915; Musgrave, A., Bib. Austr. Ent., p. 147, 1932.
- HENDEL, Friedrich. (1874-1936). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 224, 1936; Lindner, E., *B.*, *P.*, Konowia, 15: 240-247, 1936; Hering, M., Mitt. Deutsch Ent. Ges., 7: 37-40, 1936; Heikertinger, F., Koleopt. Rundschau, 22: 255, 1936.
- HENLE, Friedrich Gustav Jacob. (1809-1885). Nordenskiöld, Erik, Hist. of Biol., pp. 397-398, 1935.
- HENNEBELLE, Augustin. ( -1857). Hamet, H., Apiculteur, 2: 97, 1858.
- HENNEGUY, Louis Felix. (1850-1928). Howard, L. O., Ent. News, 39: 136, 1928; Dupont, L., Bull. Soc. Ent. France, pp. 33-34, 1928; Porter, C. E., Rev. Chilena Hist. Nat., 32: 395, 1928.
- HENRICK, George Hamilton. (1850-1939). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 6: 349, 1939.
- HENRIKSEN, Kai Ludwig. (1888-1940). Saalas, U., *P.*, Ann. Ent. Fenn., 6: 77-79, 1940; Tuxen, S. L., *B.*, *P.*, Ent. Meddel. (Copenhagen), 22: i-xvi, 1940.
- HENSEL, Reinhold Friedrich. (1826-1881). *A.*, Leopoldina, 17: 210, 1881; Martens, E. von, *B.*, Leopoldina, 18: 19-21, 1882.
- HENSHAW, Samuel. (1852-1941). Jackson, R. T., Science, 93: 342-343, 1941; Wade, J. S., et al., Proc. Ent. Soc. Wash., 43: 108-110, 1941; Usinger, R. L., Pan-Pacific Ent., 17: 84, 1941; *A.*, Rev. Ent. (Rio de J.), 12: 417, 1941; Calvert, P. P., Ent. News, 52: 241-242, 1941; Brues, C. T., Ann. Ent. Soc. Amer., 35: 123-124, 1942.
- HENTZ, Nicholas Marcellus. (1797-1856). *A.*, Nat. Cyclop. Amer. Biog., 9: 428, 1907; Burgess, E., *B.*, Occas. Papers Bost. Soc. N. H., 2: 5-13, 1875; Dow, R. P., Bull. Bklyn. Ent. Soc., 8: 106-108, 1913.
- HERBST, Carl Friedrich. ( - ). Geiser, S. W., Field & Lab., 7: 38, 1939.
- HERBST, John Friedrich Wilhelm. (1743-1807). Swainson, W., *B.*, Bib. of Zool., p. 213, 1840; Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., p. 264, 1823.
- HERBST, Paul. (1861-1927). Porter, C. E., *B.*, *P.*, Rev. Chilena Hist. Nat., 33: 77-80, 1929.
- HERETIEN, Frédéric. ( -1857). Hamet, H., Apiculteur, 2: 96-97, 1858.
- HERING, Hermann Conrad Wilhelm. (1800-1886). Dimmock, G., Psyche, 5: 36, 1888; Kraatz, G., Deutsche Ent. Ztschr., 30: 255, 1886; Schleich, C. L., *B.*, Stett. Ent. Zeit., 47: 178-182, 1886; McLachlan, R., Trans. Ent. Soc. Lond., (Proc.): lxx, 1886.
- HERMAN, Otto. (1835-1914). Csiki, E., *B.*, *P.*, Rovartani Lapok, 22: 61-67, 138, 1915.
- HERON, Francis Arthur. (1864-1940). "A. B. G.", Entomologist, 75: 23-24, 1942; Blair, K. G., Proc. Roy. Ent. Soc. Lond., (C) 6: 41, 1941-42.
- HERRICH-SCHAEFFER, Gottlieb August Wilhelm. (1799-1874). *A.*, Amer. Nat., 8:



- 447, 1874; *A.*, Ent. Mo. Mag., 11: 20, 1874; Saunders, S. S., Trans. Ent. Soc. Lond., (Proc.): xxxv, 1874; *A.*, B., Leopoldina, 10: 2-5, 1874; Hofmann, O., Stett. Ent. Zeit., 35: 277-284, 1874; *A.*, Berlin Ent. Ztschr., 18: 7, 1874; Kraatz, G., *P.*, Deutsche Ent. Ztschr., 19: 437, 1875; Musgrave, A., Bib. Austr. Ent., p. 148, 1932.
- HERRICH-SCHAEFFER, Gustav Adolf. (1836-1903). Fürnrohr, H., Ber. Naturw. Ver. Regensburg, 9: 129, 1902 (1903).
- HERRICK, Edward Claudius. (1811-1862). *A.*, Nat. Cyclop. Amer. Biog., 11: 170, 1909; *A.*, Amer. Journ. Sci., (2) 34: 159-160, 1862.
- HERVÉ, Ernest. ( -1914). Alluaud, C., Bull. Soc. Ent. France, p. 493, 1914.
- HERZ, Otto. ( - ). Kusnezov, N. J., *B.*, *P.*, Rev. Russe Ent., 5: 311-312, 1905.
- HESS, Richard Alexander. (1835-1916). Soldanski, H., Deutsche Ent. Ztschr., p. 87, 1916.
- HETSCHKO, Alfred. (1854-1933). Heikertinger, F., *B.*, *P.*, Wien. Ent. Zeit., 33: 1-5, 1933; Heikertinger, F., *P.*, Koleopt. Rundschau, 19: 147-148, 1933.
- HEWITSON, William Chapman. (1806-1878). Strecker, H., *B.*, Butterflies and moths of N. A., pp. 240-244, 1878; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 149-150, 1932; *A.*, Ent. Mo. Mag., 15: 44-45, 1878; Dunning, J. W., Entomologist, 11: 166-168, 1878; *A.*, Ent. Nachr., 4: 204, 1878; *A.*, Pet. Nouv. Ent., 2: 238, 1878; Embleton, D., *B.*, *P.*, Trans. Northumb. & Durham Soc., 7: 223-235, 1880; Bates, H. W., Trans. Ent. Soc. Lond., (Proc.): lxiii-lxvi, 1878; Dunning, J. W., *l. c.*, p. lxvii, 1879.
- HEWITT, Charles Gordon. (1885-1920). *A.*, Can. Ent., 52: 96, 1920; *A.*, Ent. Mo. Mag., 56: 93, 1920; *A.*, Ent. News, 31: 120, 1920; *A.*, *P.*, Nat. Hist., 20: 109, 202-203, 1920; Gibson, A., et al., *B.*, *P.*, Can. Ent., 52: 97-105, 1920; Wheeler, W. M., *P.*, Journ. Econ. Ent., 13: 262-263, 1920; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., pp. 209-210, 1937.
- HEYDEN, Carl Heinrich Georg von. (1793-1866). Kraatz, G., *B.*, *P.*, (in vol. 11), Berlin. Ent. Ztschr., 10: 305-316, 1866; *A.*, Stett. Ent. Zeit., 27: 212-213, 1866; *A.*, Verh. zool.-bot. Ges. Wien, 16, (Sitzb.): 20-21, 1866; Stainton, H. T., Ent. Annual, pp. 31-42, 1867, pp. 8-53, 1868; Kirschbaum, C. L., Jahrb. Nassau. Ver. Naturk., 19-20: 511-516, 1864-66.
- HEYDEN, Lucas Friedrich Julius Diminicus von. (1838-1915). Weise, J., Deutsche Ent. Ztschr., pp. 97-100, 1916; Sattler, W., *B.*, *P.*, Ent. Blätter, 11: 193-203, 1915; *A.*, Wien. Ent. Zeit., 29: 273-274, 1910; *A.*, Wien. Ent. Zeit., 35: 63, 1916; Reitter, E., *P.*, Ent. Blätter, 4: 85-88, 1908; *A.*, Ent. Ztschr., Frankfurt, 29: 56, 1915.
- HEYDENREICH, Gustav Heinrich. ( -1897). *A.*, Leopoldina, 33: 113, 1897.
- HEYNE, Alexander. (1869-1927). Korchefsky, R., *B.*, *P.*, Deutsche Ent. Ztschr., pp. 73-74, 1929.
- HICKS, Charles Henry. ( -1941). *A.*, Ann. Ent. Soc. Amer., 35: 124, 1942.
- HILL, William W. (1833-1888). Dimmock, G., Psyche, 5: 156, 1889; Smith, J. B., Ent. Amer., 3: 236, 1888.
- HINDS, Warren Elmer. (1876-1936). Thomas, F. L., *P.*, Journ. Econ. Ent., 29: 225-226, 1936; Bailey, S. F., Pan-Pacific Ent., 14: 96, 1938; Ostenberger, B. A., Science, 83: 252, 1936; Mickel, C. E., Ann. Ent. Soc. Amer., 30: 182, 1937; Horn, W., Arb. phys. angew. Ent. Berlin-Dahlem, 3: 301, 1936; Osborn, H., *P.*, Fragments Ent. Hist., p. 236, 1937.
- HINE, James Stewart. (1866-1930). *A.*, Ent. News, 42: 96, 1931; Davis, J. J., Ann. Ent. Soc. Amer., 24: 188, 1931; Kennedy, C. H., *P.*, Ohio Journ. Sci., 31: 510-511, 1931; Kennedy, C. H., Ent. News, 42: 177-180, 1931; McAtee, W. L., Auk, 48: 323-325, 1931; Galbreath, C. B., *P.*, Museum Echoes (Ohio Arch. & Hist. Soc.), 4 (1): 2, 1931; Osborn, H., *P.*, Fragments Ent. Hist., p. 213, 1937.
- HINKLEY, Holmes. ( -1891). *A.*, Psyche, 6: 60, 1891.
- HISLOP, Robert. (1815-1880). *A.*, Ent. Mo. Mag., 17: 71-72, 1880.
- HINATECK, Johann Samuel. (1801-1880). Frey, H., Mitt. Schweiz. Ent. Ges., 5: 557-560, 1877-80.
- HOCHSTEIN, Anton. (1829-1911). Weiss, H. B., et al., *P.*, Ent. News, 38: 1-4, 1925.
- HOEFNAGEL, Georg. (1545-1617?). Hagen, H., *B.*, Biblio. Ent., 1: 369-372, 1862;



- Fétis, É., *Bull. Acad. Roy. Belg.*, 21: 978-1012, 1854; Hagen, H., *Stett. Ent. Zeit.*, 19: 303-307, 1858.
- HÖLLMER, Franz. (1820-1885). *Dimmock*, G., *Psyche*, 5: 36, 1888.
- HOFFMAN, William Albert. (1894-1943). Wolcott, G. N., *Journ. Econ. Ent.*, 36: 486, 1943; Snyder, C. F., *Journ. Wash. Acad. Sci.*, 33: 287, 1943; Pratt, H. D., *Ann. Ent. Soc. Amer.*, 37: 133, 1944.
- HOFMAN, Ottmar. (1835-1900). Herrich-Schäffer, G., *P.*, *Ber. Naturw. Ver. Regensb.*, 7: 129-133, 1901; Walsingham, T. de G., *Ent. Mo. Mag.*, 36: 212-213, 1900.
- HOLL, Nicolas Joseph Eugène. (1855- ). Oberthür, C., *P.*, *Études Lép. Comp.*, 11: unpag., 1916.
- HOLLAND, William Jacob. (1848-1932). Engelhardt, G. P., *Bull. Bklyn. Ent. Soc.*, 28: 79, 1933; Avinoff, A., *B.*, *P.*, *Ent. News*, 44: 28, 141-144, 171-177, 1933; Hungerford, H. B., *Ann. Ent. Soc. Amer.*, 26: 188-189, 1933; Avinoff, A., *Ann. Carnegie Mus.*, 19: 11-13, 1928; Seitz, A., *Ent. Rundschau*, 50: 211-212, 1933; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 220, 1937.
- HOLLRUNG, Max. (1858-1937). *A.*, *Arb. phys. angew. Ent. Berlin-Dahlem*, 4: 246, 1927.
- HOLMBERG, Eduardo Ladislao. (1852-1937). Dallas, E. D., *Rev. Soc. Ent. Argentina*, 9: 135-137, 1937; *A.*, *Arb. phys. angew. Ent. Berlin-Dahlem*, 5: 73, 1938; *A.*, *B.*, *P.*, *Rev. Soc. Ent. Argentina*, 10: 91-92, 1938; Porter, C. E., *P.*, *Rev. Chilena Hist. Nat.*, 41: 297-299, 1937.
- HOLMERZ, Conrad Georg Gottfrid. (1839-1907). Trybom, F., *P.*, *Ent. Tidskr.*, 28: 119-121, 1907.
- HOLMGREN, August Emil. (1829-1888). Kriechbaumer, J., *Ent. Nachr.*, 15: 144-146, 1889; *A.*, *Ent. Mo. Mag.*, 25: 309, 1888-89; Spangberg, J., *B.*, *P.*, *Ent. Tidskr.*, 10: 165-174, 1889; Howard, L. O., *Hist. of Appl. Ent.*, pp. 290-291, 1930; Musgrave, A., *Bib. Austr. Ent.*, p. 152, 1932.
- HONEGGER-ROSENMUND, Hermann. (1845-1927). *A.*, *P.*, *Mitt. Schweiz. Ent. Ges.*, 14: 85-86, 1928.
- HONRATH, Eduard G. (1837-1894). *A.*, *Ent. News*, 6: 32, 1895; Elwes, H. J., *Trans. Ent. Soc. Lond.*, (Proc.): lvii, 1893.
- HOOKER, Robert. (1635-1703). Miall, L. C., *Early Naturalists, their lives and work*, pp. 135-145, 1912.
- HOOKER, Charles Worcester. (1883-1913). *A.*, *Ent. News*, 24: 192, 1913; Fernald, H. T., *P.*, *Journ. Econ. Ent.*, 6: 334-335, 1913; *A.*, *Science*, n. s., 37: 368, 1913.
- HOOKER, William Jackson. (1785-1865). *A.*, *Proc. Roy. Soc. Lond.*, 15: xxv-xxx, 1866-67.
- HOPE, Frederick William. (1797-1862). *A.*, *Memorial (rep. from Gentleman's Mag., no date)*; Pettigrew, T. J., et al., *B.*, J. O. Westwood's *Thesaurus Entomologicus Oxoniensis*, pp. xvii-xxiv, 1874; Swainson, W., *Bib. of Zool.*, p. 215, 1840; *A.*, *Cent. Hist. Ent. Soc. Lond.*, pp. 123-124, 1933; *A.*, *Proc. Linn. Soc. Lond.*, pp. xc-xcii, 1862; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 153-154, 1932.
- HOPFFGARTEN, Georg Maximilian von. (1825-1904). Von Haupt, B., *Deutsche Ent. Ztschr.*, 49: 174-176, 1905.
- HOPPIN, Washington. (1827-1867). Weiss, H. B., *Ent. News*, 36: 257-262, 1925.
- HOPPING, Ralph. (1868-1941). Leech, H. B., *P.*, *Proc. Ent. Soc. B. C.*, 38: 3-4, 1942; Blaisdell, F. E., et al., *B.*, *P.*, *Pan-Pacific Ent.*, 18: 1-3, 1942; *A.*, *Ent. News*, 53: 60, 1942; *A.*, *Ann. Ent. Soc. Amer.*, 35: 124-125, 1942; Osborn, H., *Fragments Ent. Hist.*, p. 266, 1937.
- HORI, Matsuji. (1896-1938). Kuwayama, S., et al., *P.*, *Kontyu*, 12: 155-156, 1938.
- HORMUZAKI, Constantin von. (1863-1937). "H. W.", *Ent. Ztschr. (Frankfurt)*, 51: 97, 1937; *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 4: 241, 1937; *A.*, *Koleopt. Rundschau*, 23: 116, 1937.
- HORN, George Henry. (1840-1897). *A.*, *Nat. Cyclop. of Amer. Biog.*, 7: 502-503, 1897; *A.*, *Psyche*, 8: 159-160, 1898; *A.*, *P.*, *Ent. News*, 9: 1-3, 1898; Calvert, P. P., *B.*, *P.*, *Trans. Amer. Ent. Soc.*, 25: i-lxxii, 1898; Henshaw, S., *Dimmock's Spec. Bib.* no. 2, pp. 1-6, 1879; Noland, E. J., *Proc. Acad. Sci. Phila.*, 49: 505-510, 515-518, 1897; Smith, J. B., *Proc. Acad. Nat. Sci. Phila.*, 49: 529-535, 1897; Smith, J. B., *Science*, n. s., 7: 73-77, 1898; Smith, J. B., *P.*, *Pop. Sci.*

- Mo., 76: 469, 1910; Kraatz, G., *Deutsche Ent. Ztschr.*, 42: 10, 1898; Trimen, R., *Trans. Ent. Soc. Lond.*, (Proc.): lxxii-lxxiii, 1897; Cresson, E. T., et al., *P., History Amer. Ent. Soc.*, 1911; Essig, E. O., *P., Hist. of Ent.*, pp. 654-658, 1931; Osborn, H., *P., Fragments Ent. Hist.*, pp. 163-164, 1937.
- HORN, Walther. (1871-1939). Kleine, R., *Ent. Ztschr. (Frankfurt)*, 45: 209-210, 1931; Sachtleben, H., *Ent. Ztschr. (Frankfurt)*, 50: 309-311, 1936; Sachtleben, H., B., *P., Arb. morph. taxon. Ent. Berlin-Dahlem*, 6: 201-202, 1939; *A., Journ. N. Y. Ent. Soc.*, 47: 226, 1939; Arrow, G. J., *Ent. Mo. Mag.*, 75: 204-205, 1939; *A., Rev. Ent. (Rio de J.)*, 10: 483, 1939; *A., Ent. News*, 51: 11, 1940; Sachtleben, H., *P., Arb. phys. angew. Ent. Berlin-Dahlem*, 6: 217-222, 1939; Schulthess, A. von, *P., Mitt. Schweiz. Ent. Ges.*, 17: 617-618, 1939; Usinger, R. L., *Pan-Pacific Ent.*, 16: 12, 1940; Saalas, U., *P., Ann. Ent. Fenn.*, 5: 233-235, 1939; *A., Boll. Soc. Ent. Ital.*, 71: 153, 1939; Bruch, C., *P., Rev. Soc. Ent. Argentina*, 11: 45-48, 1941; Martini, E., *P., Ztschr. angew. Ent.*, 26: 683-689, 1940; Porter, C. E., B., *P., Rev. Chilena Hist. Nat.*, 43: 195-198, 1939; Korschefsky, R., *Ent. Rundschau*, 56: 385-387, 1939; Henriksen, K. L., *P., Ent. Meddel. (Denmark)*, 20: 591-593, 1940; Musgrave, A., B., *Bib. Austr. Ent.*, pp. 155-156, 1932; Osborn, H., *P., Fragments Ent. Hist.*, 1937.
- HORNE, Charles. (1824-1872). Westwood, J. O., *Trans. Ent. Soc. Lond.*, (Proc.): 1, 1872; Newman, E., *Entomologist*, 6: 104, 1872.
- HORNIG, Hermann. (1858-1942). Poole, E. L., *Ent. News*, 53: 238-239, 1942.
- HORNIG, Johann von. (1819-1886). Dimmock, G., *Psyche*, 5: 36, 1888; Wachtl, F., *A., Wien. Ent. Zeit.*, 6: 48, 1887; Rebel, H., B., *Verh. zool.-bot. Ges. Wien*, 37: (Sitzb.), 42-46, 1887; *A., Zool. Anzeiger*, 10: 104, 1887.
- HORSFIELD, Thomas. (1773-1859). *A., Proc. Linn. Soc. Lond.*, pp. xxv-xxvi, 1860.
- HORTON, Edward. (1816-1871). *A., Ent. Mo. Mag.*, 7: 215-216, 1871.
- HORVATH, Geza. (1847-1937). *A., Arb. morph. taxon. Ent. Berlin Dahlem*, 4: 351, 1937; Imms, A. D., *Proc. Roy. Ent. Soc. Lond.*, ser. C, 2: 60, 1937; Torre-Bueno, J. R. de la, *Bull. Bklyn. Ent. Soc.*, 32: 194, 1937; *A., Indian Journ. Ent.*, 1: 128, 1939; Musgrave, A., *Bib. Austr. Ent.*, p. 156, 1932; *A., Miscellanea Ent.*, 19 (11): 112, 1911; Howard, L. O., *P., Hist. of Applied Ent.*, 1930.
- HOULBERT, Constant Vincent. (1857- ). Oberthür, B., *P., Études Léop. Comp.*, 11: unpagé, 1916.
- HOWARD, Charles Walter (1882-1928). Riley, W. A., *Ent. News*, 39: 167-168, 1928; Riley, W. A., *Journ. Econ. Ent.*, 21: 440-441, 1928; Hoffmann, W. E., B., *P., Lingnan Sci. Journ.*, 5: 293-299, 1927 (1929); Hoffmann, W. E., B., *Lingnan Sci. Journ.*, 10: 335-337, 1931.
- HOWE, Reginald Heber. (1875-1932). *A., Ent. News*, 43: 140, 1932; Osborn, H., *P., Fragments Ent. Hist.*, p. 231, 1937.
- HOWLETT, Frank Milburn. (1877-1920). *A., Ent. News*, 32: 64, 1921; Scott, H., *Ent. Mo. Mag.*, 56: 234, 262, 1920.
- HUBBARD, Henry Guernsey. (1850-1899). Schwarz, E. A., et al., B., *P., Proc. Ent. Soc. Wash.*, 4: 350-360, 1901; Smith, J. B., *P., Ent. News*, 10: 80-83, 1899; "T. H. P.", *Can. Ent.*, 31: 72, 1899; Wade, J., S., *Proc. Ent. Soc. Wash.*, 38: 121, 1936; Howard, L. O., *P., Hist. Applied Ent.*, 1930; Osborn, H., *P., Fragments Ent. Hist.*, pp. 186-187, 1937.
- HUBER, Franz. (1750-1831). Herrick, S. B., *P., Pop. Sci. Mo.*, 6: 385, 486-498, 1875; Jardine, W., *P., Nat. Libr.*, 6: 17-70, 1858; Swainson, W., *Bib. of Zool.*, pp. 216-218, 1840; Decandolle, A. P., *Notice sur la vie et les écrits de F. Huber*, Paris, 1832; Dumeril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, pp. 265-266, 1823.
- HUBER, Jakob. (1868-1914). *A., Ent. News*, 25: 288, 1914.
- HUBER, Jean Pierre. (1777-1840). Dumeril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, pp. 265-266, 1823.
- HÜBNER, Jacob. (1761-1826). Geyer, C., B., *Thon's Archiv*, 1: 28-31, 1827; Freyer, C. F., *Stett. Ent. Zeit.*, 22: 297-299, 1861; Eisinger, F., B., *P., Internat. Ent. Ztschr.*, 10: 125-128, 1917; Musgrave, A., *Bib. Austr. Ent.*, p. 157, 1932; Kirby, W. F., *New English Fac-simile Ed. of Jacob Hübner's Sammlung Exot. Schmett.*

- by P. Wytzman, 1: i-ii, 1907; Essig, E. O., *B., P.*, Hist. of Ent., pp. 664-667, 1931.
- HUDD, Alfred Edmund. (1845-1920). *A.*, Ent. News, 32: 64, 1921; Griffiths, G., *C.*, Ent. Mo. Mag., 56: 262-263, 1920; Turner, H. J., Ent. Record, 32: 216, 1920.
- HUEMER, Hans. (1858-1935). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 2: 218, 1935.
- HUGO, Rudolph. (1874-1938). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 5: 296, 1938.
- HUGUENIN, Julius Caesar. (1840-1926). *A.*, Pan-Pacific Ent., 3: 152, 1927; Van Duzee, E. P., Proc. Pac. Coast Ent. Soc., 2: 95-96, 1926-27; Essig, E. O., *P.*, Hist. of Ent., p. 667, 1931.
- HULST, George Duryea. (1846-1900). Smith, J. B., *P.*, Ent. News, 11: 613-615, 1900; Smith, J. B., *P.*, Pop. Sci. Mo., 76: 472, 1910; Osborn, H., *P.*, Fragments Ent. Hist., 1937.
- HUMBOLDT, Friedrich Heinrich Alexander. (1769-1859). *A.*, Natur, 8: 160, 1859; *A.*, Kosmos, 3: 80, 1859; Lea, J., Proc. Acad. Nat. Sci. Phila., pp. 162-163, 1860; Reitsma, A. T., Album der Natuur, pp. 257-282, 1859; Friswell, H., Recreative Sci., 1: 15-20, 55-60, 1860; *A.*, Proc. Roy. Soc. Lond., 10: xxxix-xlii, 1860; Trautschold, H., Bull. Soc. Nat. Moscou, 32 (1): 292-301, 1859; Meissner, O., *P.*, Ent. Ztschr. (Frankfurt), 43: 130, 1929; Nordenskiöld, Erik, *P.*, Hist. of Biol., pp. 314-316, 1935.
- HUNTER, John. (1728-1793). Wheeler, W. M., et al., *P.*, N. E. Journ. Med., 200: 810-823, 1929; Locy, W. A., *P.*, Story of Biol., pp. 337-340, 1925; Nordenskiöld, Erik, Hist. of Biol., pp. 260-262, 1935.
- HUNTER, Walter David. (1875-1925). *A.*, Ent. News, 37: 32, 1926; *A.*, Neb. Alumnus, 21: 377-378, 1925; Howard, L. O., et al., *P.*, Ann. Ent. Soc. Amer., 19: 257-258, 1926; Howard, L. O., *P.*, Journ. Econ. Ent., 18: 844-848, 1925; Howard, L. O., *B., P.*, Proc. Ent. Soc. Wash., 27: 169-181, 1925; Howard, L. O., Science, n. s., 62: 430, 1925; Howard, L. O., *P.*, Semi-Weekly Farm News, Dallas, Tex., p. 12, Dec. 1, 1925; Marlatt, C. L., U. S. Dept. Agr. Fed. Hort. Bd., Serv. and Reg. Announcements no. 85, Oct.-Dec., 1925, pp. 1-2, 1926; Wade, J. S., Proc. Ent. Soc. Wash., 38: 121-122, 1936; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., pp. 189-190, 1937.
- HUTCHINSON, Wilbur Laurin. ( -1933). Hungerford, H. B., Ann. Ent. Soc. Amer., 27: 122, 1934.
- HUTTON, Frederick Wollaston Hutton. (1836-1903). Howard, L. O., *P.*, Hist. of Applied Ent., pp. 400, 401, 1930.
- HUXLEY, Thomas Henry. (1825-1895). "M. F.", Proc. Roy. Soc. Lond., 59: xlvii-lxvi, 1896; *A.*, Ent. Mo. Mag., 31: 196, 1895; Huxley, L., *P.*, Life and Letters of T. H. Huxley, vols. 1-3, 1908; *A.*, Journ. of Bot. (Lond.), 33: 312, 1895; Nordenskiöld, Erik, Hist. of Biol., pp. 488-491, 1935.
- HUYGHE, Fernand. (1887-1916). Berland, L., *B., P.*, Ann. Soc. Ent. France, 89: 427-428, 1920.
- HYATT, Alpheus. (1838-1902). Benjamin, M., *P.*, Harper's Weekly, 34: 925-926, 1890; Brooks, W. K., *B.*, Biog. Mem. Nat. Acad. Sci., 6: 311, 325, 1909; Crosby, W. O., *B.*, Bull. Geol. Soc. Amer., 14: 504-512, 1903; Dall, W. H., *P.*, Pop. Sci. Mo., 60: 439-441, 1902; Henshaw, S., Science, n. s., 15: 300-302, 1902; Mayer, A. C., Pop. Sci. Mo., 78: 129-146, 1911; Packard, A., Jr., Proc. Amer. Acad. Arts & Sci., 38: 715-727, 1903; Putnam, F. W., et al., Proc. Bost. Soc. N. H., 30: 413-433, 1902; Stanton, T. W., Proc. Wash. Acad. Sci., 5: 389-391, 1903 (1904); Tarr, R. S., *P.*, Pop. Sci. Mo., 28: 145, 261-267, 1885; Zingiebel, F., *P.*, Pop. Sci. Mo., 55: 451, 1899; Osborn, H., Fragments Ent. Hist., p. 211, 1937.
- HYATT, James. (1817-1904). Schoonhoven, J. J., Science, n. s., 19: 635-636, 1904.
- IHERING, Hermann von. (1850-1930). *A., P.*, Rev. Mus. Paulista, 17: 553-566, 1931; *A.*, Mitt. Deutsch. Ent. Ges., 1: 34, 1930.
- IHERING, Rodolpho von. (1883-1939). Borgmeier, T., *B., P.*, Rev. Ent. (Rio de J.),

- 10: 728-729, 1939; Porter, C. E., *Rev. Chilena Hist. Nat.*, 44: 396, 1940.
- ILCHEFF, M. Dylcho. ( - ). *A.*, *Ent. News*, 36: 224, 1925; Graves, P. P., *Ent.*, 58: 128, 1925.
- ILLIDGE, Rowland. (1846-1929). Tryon, H., *B., P.*, *Queensl. Nat.*, 7: 13-19, 1929; Musgrave, A., *Bib. Austr. Ent.*, pp. 158-159, 1932.
- IMAGE, Selwyn. (1849-1930). Turner, H. J., *Ent. Record*, 42: 160, 1930; Sheldon, W. G., *Entomologist*, 63: 238-239, 1930; Jordan, K., *Proc. Ent. Soc. Lond.*, 5: 129, 1931.
- IMHOF, Othmar Emil. (1855-1936). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 4: 160, 1937; "G. H.-P." *Mitt. Schweiz. Ent. Ges.*, 16: 761, 1936.
- INCHBALD, Peter. (1815-1896). *A.*, *Trans. Ent. Soc. Lond.*, (Proc.): xciii, 1896.
- ISENSCHMID, Moritz. (1850-1878). Perty, J. A. M., *Mitt. Schweiz. Ent. Ges.*, 5: 488-492, 1877-80.
- IVASCHINZOFF, Martin. (1901-1934). Hellén, W., *Notulae Ent.*, *P.*, 15: 103-104, 1935.
- IZQUIERDO, Vicente. (1850-1926). Porter, C. E., *B., P.*, *Rev. Chilena Hist. Nat.*, 25: 82-83, 1921; *A., P.*, *Rev. Chilena Hist. Nat.*, 17: 296-297, 1913; Porter, C. E., *B.*, *Rev. Chilena Hist. Nat.*, 30: 184-186, 1926.
- JACOB, John Kenneth. ( -1941). Spencer, G. J., *Proc. Ent. Soc. B. C.*, 38: 4-5, 1942.
- JACOBSEN, Oluf. (1846-1921). Kryger, J. P., *B., P.*, *Ent. Meddel.*, 14: 120-124, 1923.
- JACOBSON, Gheorghii Gheorghievich. (1871-1926). Obenberger, J., et al., *Acta Soc. Ent. Cechosl.*, 23: 86-88, 1926; *A., B., P.*, *Rev. Russe Ent.*, 22: 1-28, 1928; Kalandadze, Anzeiger f. Schädlingssk., 3: 35, 1927; Bogdanov-Kamkov, N. N., *P.*, *Enclosure with Bull. Bur. Perm. Cong. Entomo-Phytopath. Russ.* 3 (4-5): 1-4, 1926.
- JACOBY, Martin. (1842-1907). *A.*, *Ent. Record*, 20: 47, 1908; Walker, J. J., *Ent. Mo. Mag.*, 44: 45, 1908; *A., P.*, *Entomologist*, 41: 25-26, 1908; Horn, W., *P.*, *Deutsche Ent. Ztschr.*, pp. 427-428, 1908; Jacobson, C., *B.*, *Entomologist*, 42: 10-16, 1909; Musgrave, A., *Bib. Austr. Ent.*, pp. 161-162, 1932; Waterhouse, C. O., *Trans. Ent. Soc. Lond.*, (Proc.), pp. xcvi-xcviii, 1907.
- JACOT, Arthur Paul. (1890-1939). *A., B.*, *Florida Ent.*, 24: 43-47, 1941.
- JAEGER, Benedict. (1789-1869). Calvert, P. P., *Ent. News*, 33: 252, 1922; Weiss, H. B., *Ent. News*, 36: 257-262, 1925; Weiss, H. B., *Proc. N. J. Hist. Soc.*, n. s., 7: 196-207, 1922.
- JAEGER, Julius. (1834-1922). Porritt, G. T., *Ent. Mo. Mag.*, 58: 114-115, 1922.
- JAFFUEL, Felix. (1874-1939). Porter, C. E., *B.*, *Rev. Chilena Hist. Nat.*, 43: 124-126, 1939.
- JAKOBSON, G. G. (See under Jacobson).
- JAKOVLEV, Alexandre Ivanovich. (1863-1909). Semenov-Tian-Shansky, A., *B., P.*, *Rev. Russe Ent.*, 10: lxi-lxxii, 408, 1910; *A.*, *Rev. Russe Ent.*, 9: 483, 1909.
- JAKOVLEV, Basilii Evgrafovich. (1839-1908). Kusnezov, N. J., *Rev. Russe Ent.*, 8: 212, 1908; Horn, W., *Deutsche Ent. Ztschr.*, p. 170, 1909.
- JAN, Georg. (1791-1866). Silbenrock, F., *P.*, *Bot. & Zool. in Oesterr.* 1850-1900 Festsch., pp. 445-446, 1901.
- JANET, Charles. (1849-1932). Berland, L., *B.*, *Ann. Soc. Ent. France*, 101: 157-164, 1932; *A.*, *Wien. Ent. Zeit.*, 49: 56, 1932.
- JANSON, Edward Wesley. (1822-1891). *A.*, *Ent. News*, 2: 188, 1891; *A.*, *Ent. Record*, 2: 223, 1891; *A.*, *Entomologist*, 24: 252, 1891; *A.*, *Ent. Mo. Mag.*, 27: 278, 1891.
- JANSON, Oliver Erichson. (1850-1926). Calvert, P. P., *Ent. News*, 38: 260-261, 1927; *A., P.*, *Ent. Mo. Mag.*, 63: 15-16, 1927; *A.*, *Entomologist*, 60: 72, 1927; Poulton, E. B., *Proc. Ent. Soc. Lond.*, 1: 74-75, 1926.
- JAROSCHEWSKY, W. A. (See under Yaroshevski).
- JAYNE, Horace. (1859-1913). Calvert, P. P., *P.*, *Ent. News*, 24: 383-384, 1913; Osborn, H., *Fragments Ent. Hist.*, p. 144, 1937.
- JENISON-WALWORTH, Wilhelm von. (1796-1853). Heyden, C. von, *Stett. Ent. Zeit.*, 16: 15-16, 1855.

- JENKINSON, Francis John Henry. (1853-1923). Scott, H., Ent. Mo. Mag., 59, 261-262, 1923.
- JENNINGS, Allan Hinson. (1866-1918). Pierce, D. W., et al., *B., P.*, Proc. Ent. Soc. Wash., 21: 61-63, 1919; Osborn, H., Fragments Ent. Hist., p. 204, 1937.
- JENSEN, Lars Peter. (1869-1934). Wolff, N. L., *B., P.*, Ent. Meddel., 19: 183-186, 1935.
- JENSEN-HAARUP, Anders Christian. (1863-1934). Esben-Petersen, P., *P.*, Ent. Meddel., 19: 178-181, 1935; Lindberg, H., *P.*, Notulae Ent., 15: 101-102, 1935; Esben-Petersen, P., *P.*, Flora og Fauna, 42: 36-39, 1936.
- JOANNIS, Joseph de. (1854-1932). le Cerf, F., *B., P.*, Ann. Soc. Ent. France, 103: 187-198, 1934; *A.*, Ent. Record, 45: 142, 1933; Berthet, H., Bull. Soc. Ent. France, 37: 241, 1932; "H. W.", Ent. Ztschr., Frankfurt, 46: 209, 1932; Anthony, R., Bull. Mus. Paris, (2) 4: 782, 1932; Navas, L., Bol. Soc. Ent. Espan., 15: 128-129, 1932.
- JOHANSON, Carl Hans. (1828-1908). Lampa, S., *P.*, Ent. Tidskr., 29: 279-281, 1908.
- JOHN, Oskar. (1875-1935). Horn, W., Arb. morph. taxon. Ent. Berlin-Dahlem, 2: 63, 1935.
- JOHNSON, Charles Willison. (1863-1932). Gray, A. F., *P.*, The Nautilus, 46: 129-134, 1933; Brooks, W. S., *P.*, Bull. Bost. Soc. N. H., 65: 3-5, 1932; Brues, C. T., *P.*, Ent. News, 44: 113-116, 1933; Hungerford, H. B., Ann. Ent. Soc. Amer., 26: 189, 1933; Osborn, H., *P.*, Fragments Ent. Hist., p. 237, 1937.
- JOHNSON, James S. (1836-1920). "H. S.", Ent. News, 32: 63-64, 1921; Osborn, H., Fragments Ent. Hist., p. 222, 1937.
- JOHNSON, Orson Bennett. (1848-1917). *A.*, Ent. News, 28: 338, 1917; *A.*, Science, n. s., 45: 360, 1917.
- JOHNSON, William Frederick. (1852-1934). *A.*, Ent. Record, 46: 100, 1934; Riley, N. D., Entomologist, 67: 240, 1934.
- JOHNSON, Willis Grant. (1866-1908). *A.*, Ent. News, 19: 242, 1908; Felt, E. P., et al., *P.*, Journ. Econ. Ent., 1: 163-164, 1908; Wade, J. S., Proc. Ent. Soc. Wash., 38: 122-123, 1936; Osborn, H., *P.*, Fragments Ent. Hist., p. 216, 1937.
- JOHNSTONE, Douglas Charles. (1890-1932). Frohawk, F. W., Entomologist, 65: 120, 1932.
- JOICEY, James John. (1871-1932). Talbot, G., Ent. News, 43: 140, 1932; Riley, N. D., Entomologist, 65: 142-144, 1932; *A.*, Ent. Record, 44: 68, 1932.
- JONES, Albert Hugh. ( -1924). *A.*, Ent. News, 35: 263, 1924; Green, E. E., Trans. Ent. Soc. Lond., (Proc.), p. clxi, 1924.
- JONES, Hugh Parry. (1893-1937). Carr, J. W., Ent. Mo. Mag., 73: 93-94, 1937; Carr, J. W., Ent. Record, 49: 64, 1937; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 241, 1937; Imms, A. D., Proc. Roy. Ent. Soc. Lond., (C) 2: 62, 1937; Carr, J. W., Journ. Soc. Brit. Ent., 1: 212-213, 1938.
- JONES, Thomas Henry. (1885-1941). Hyslop, J. A., et al., *B., P.*, Proc. Ent. Soc. Wash., 43: 61-62, 1941; Collins, C. W., et al., Journ. Econ. Ent., 34: 328, 1941; Merrill, C. B., Florida Ent., 25: 13-14, 1942.
- JONES, William. ( -1818). Poulton, E. B., et al., *P.*, Trans. Soc. Brit. Ent., 1: 139-155, 1934.
- JONSTON, John. (1603-1675). Locy, W. A., Story of Biol., pp. 300-301, 1925.
- JÖRGENSEN, Hans Nicolaj Lavrids. (1865-1937). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 5: 187, 1938; Sonderup, H. P. S., *P.*, Ent. Meddel., 20: 107-108, 1938.
- JÖRGENSEN, Peter. (1870-1937). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 242, 1937; Hoffmann, F., Ent. Ztschr. Frankfurt, 51: 257, 1937; Esben-Petersen, P., *P.*, Ent. Meddel., 20: 105-106, 1938.
- JOURDHEUILLE, Camille. (1830-1909). Mabille, P., *B., P.*, Ann. Soc. Ent. France, 78: 575-577, 1909.
- JOUSSEAU, Félix. ( -1921). *A.*, Bull. Mus. Paris, 27: 482-483, 1921; *A.*, Journ. Conchyl., 66: 80, 1921.
- JOUTEL, Louis Hippolyte. (1858-1916). Davis, W. T., *B., P.*, Journ. N. Y. Ent. Soc., 24: 239-243, 1916; Osborn, H., Fragments Ent. Hist., pp. 205-206, 1937.
- JOY, Ernest Edward Cooper. (1869-1940). "W. R.-S.", Entomologist, 73: 264, 1940.

- JULICH, Wilhelm. (1839-1893). *A.*, Ent. News, 5: 32, 1894; "T. L. C.", *Psyche*, 7: 36, 1894.
- JUNGUS (JUNG), Joachim. (1587-1657). Nordenskiöld, Erik, *Hist. of Biol.*, pp. 194-195, 1935.
- JUNK, Wilhelm. ( -1942). Riley, N. D., *Entomologist*, 77: 96, 1944; Torre-Bueno, J. R., de la, *Bull. Bklyn. Ent. Soc.*, 39: 83, 96, 1944.
- JURINE, Louis. (1751-1819). Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, p. 265, 1823; *A.*, Meisner's *Naturw. Aneiger*, 3: 50, 1819.
- KAHL, Paul Hugo Isidor. (1859-1941). *A.*, Ent. News, 52: 150, 1941; *A.*, *Science*, 93: 367, 1941; Avinoff, A., *Ann. Ent. Soc. Amer.*, 35: 125, 1942.
- KAISER, Oskar. (1896-1935). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 2: 309, 1935.
- KAMMERER, Paul. (1868-1939). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 6: 69, 1939.
- KÄMPFER, Engelbert. (1651-1716). Müldener, R., *Die Natur*, 20: 111-112, 118-120, 137-140, 1871.
- KANE, William Francis de Vismes. (1840-1918). *A.*, Ent. News, 30: 209, 1919; Gardner, W., *Ent. Mo. Mag.*, 54: 254-255, 1918; Rowland-Brown, H., *Entomologist*, 51: 239-240, 1918.
- KARNY, Heinrich Hugo. (1886-1939). *A.*, *Journ. Econ. Ent.*, 32: 733, 1939; *A.*, Ent. News, 50: 212, 1939; Sachtleben, H., *Arb. phys. angew. Ent. Berlin-Dahlem*, 6: 315-316, 1939; Usinger, R. L., *Pan-Pacific Ent.*, 16: 12, 1940; *A.*, *Ciencia (Mex.)*, 1: 23, 1940; *A.*, *Boll. Soc. Ent. Ital.*, 71: 153, 1939; *A.*, *Rev. Ent. (Rio de J.)*, 10: 731, 1939; Howard, L. O., *Hist. Applied Ent.*, pp. 356, 359, 1930.
- KARSCH, Ferdinand Anton Franz. (1853-1936). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 4: 64, 161, 1937; Musgrave, A., *Bib. Austr. Ent.*, p. 171, 1932.
- KARSTEN, Hermann Gustav Wilhelm Karl. (1817-1877). *A.*, *B.*, *Leopoldina*, 13: 130, 162-163, 1877; Müller, K., *Die Natur*, 20: 124-126, 129-132, 145-148, 163-167, 169-172, 185-188, 193-196, 201-204, 217-220, 225-228, 245-251, 261-263, 267-270, 281-284, 299-302, 313-316, 321-324, 339-342, 345-348, 361-364, 369-372, 385-388, 393-396, 404-408, 1871.
- KASCHKE, Karl. (1852-1935). Rupp, F., *P.*, Ent. Rundschau, 53: 241-243, 1936; Rupp, F., *P.*, Ent. Ztschr., Frankfurt, 50: 25-27, 1936.
- KAUP, Johann Jakob. (1803-1873). *A.*, *Leopoldina*, 9: 18-20, 1873; *A.*, *Ibis*, (3) 4: 471-472, 1874.
- KEARFOTT, William Dunham. (1864-1917). *A.*, *P.*, *B.*, Ent. News, 29: 1-3, 1918; Gibson, A., *B.*, *Can. Ent.*, 50: 71-72, 1919; *A.*, *B.*, *Journ. N. Y. Ent. Soc.*, 25: 238-239, 1917.
- KELLER, George J. (1873-1926). Buchholz, O., *Journ. N. Y. Ent. Soc.*, 34: 293, 1926.
- KELLICOTT, David Simons. (1842-1898). *A.*, Ent. News, 9: 128, 1898; *A.*, *Nat. Cyclop. of Amer. Biog.*, 13: 299-300, 1906; Calvert, P. P., Ent. News, 9: 160, 1898; Webster, F. M., *Ann. Rpt. Ent. Soc. Ont.*, 29: 105-106, 1898; Webster, F. M., *Can. Ent.*, 30: 166-167, 1898; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 232, 1937.
- KELLOGG, Vernon Lyman. (1867-1937). *A.*, *Journ. Econ. Ent.*, 30: 808, 1937; Osborn, H., *P.*, *Journ. Econ. Ent.*, 31: 325-326, 1938; *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 5: 186-187, 1938; *A.*, *Can. Ent.*, 69: 277, 1937; *A.*, *Science*, n. s., 86: 151, 1937; Mickel, C. E., *Ann. Ent. Soc. Amer.*, 31: 120-121, 1938; Musgrave, A., *Bib. Austr. Ent.*, p. 171, 1932; *A.*, *Who's Who in Science*, p. 299, 1913; McClung, C. E., *Science*, 87: 158, 159, 1938; *A.*, *Amer. Men of Science*, (ed. 3): 372, 1921; Essig, E. O., *B.*, *P.*, *Hist. of Ent.*, 668-670, 1931; Osborn, H., *Fragments Ent. Hist.*, p. 182, 1937.
- KENNEL, Julius von. (1854-1939). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 6: 188, 1939; Strand, E., *B.*, *Folio Zool. & Hydrobiol. (Riga)*, 10: 364-368, 1940; Kiel, Prof., *Zool. Anzeiger*, 125: 272, 1939.
- KENRICK, George Hamilton. (1850-1939). Bethune-Baker, G. T., *Ent. Record*, 61: 116, 1939.



- KERKLOTS, Jean Adrien. (1820-1872). Vollenhoven, S. C. S. van, *Pet. Nouv. Ent.*, 4: 201, 1872.
- KERLEE, Roy. (1905-1928). *A.*, *Mont. St. Bd. Ent. Bienn. Rpt.*, 7: 9, 1927-28.
- KERREMANS, Charles. (1847-1915). Fenyès, A., *Ent. News*, 27: 48, 1916; Soldanski, H., *Deutsche Ent. Ztschr.*, p. 226, 1916; Semenov-Tian-Shansky, A., *P.*, *Rev. Russe Ent.*, 15: 683, 1915; *A.*, *Bull. Soc. Ent. France*, p. 249, 1915.
- KERTESZ, Kalman. (1867-1922). Cresson, E. T., Jr., *Ent. News*, 34: 128, 1923; "J. J.", *Folia Ent. Hung.*, 1: 7-8, 1923.
- KESSLER, Hermann Friedrich. (1816-1897). *A.*, *Leopoldina*, 33: 73, 91, 1897.
- KHEIL, Napoleon Manuel. (1849-1923). Vávra, V., *B.*, *P.*, *Acta Ent. Mus. Prag.*, 2: 3-4, 1924.
- KIDD, John. (1775-1851). Westwood, J. O., *Trans. Ent. Soc. Lond.*, (2) 1: 137, 1852.
- KIEFFER, Jean Jaques. (1856-1925). *A.*, *Ent. News*, 37: 280, 1926; Edwards, F. W., *Ent. Mo. Mag.*, 62: 44-45, 1926; Travares, J. da S., *B.*, *Broteria, Ser. Zool.*, 23: 126-148, 1926; Vimmer, A., *Acta Soc. Ent. Cechoslov.*, 23: 73, 1926; Musgrave, A., *Bib. Austr. Ent.*, pp. 173-174, 1932; Hedicke, H., *Deutsche Ent. Ztschr.*, p. 440, 1925.
- KIESENWETTER, Ernst August Hellmuth von. (1820-1880). Fitch, E. A., *Entomologist*, 13: 120, 1880; *A.*, *Nature*, 21: 538, 1880; *A.*, *Ent. Nachr.*, 6: 150-151, 1880; Kraatz, G., *B.*, *P.*, *Deutsche Ent. Ztschr.*, 24: 323-336, 1880; *A.*, *Naturaliste*, 2: 208, 1880; Kirsch, B., *Leopoldina*, 16: 67-70, 1880; *A.*, *Ent. Mo. Mag.*, 16: 280, 1880.
- KILLIAS, Eduard. (1828-1891). *A.*, *Mitt. Schweiz. Ent. Ges.*, 373-375, 1892.
- KING, Albert Freeman Africanus. (1841-1914). Howard, L. O., *P.*, *Hist. of Applied Ent.*, p. 480, 1930.
- KING, George B. (1848-1916). Fernald, H. T., *Journ. Econ. Ent.*, 9: 512, 1916.
- KING, Robert Lethbridge. (1823-1897). Musgrave, A., *Bib. Austr. Ent.*, p. 175, 1932.
- KING, Vernon. (1886-1918). *A.*, *Can. Ent.*, 50: 314, 1918; *A.*, *Ent. News*, 29: 400, 1918; *A.*, *Journ. Econ. Ent.*, 11: 390-391, 1918.
- KIRBY, William (1759-1850). Dow, R. P., *Bull. Bklyn. Ent. Soc.*, 8: 68-74, 1913; Freeman, J., *P.*, (B. by Longman), *Life of Kirby, 1852*; Morris, F. J. A., *Can. Ent.*, 47: 384-386, 1915; Spence, W. B., *Trans. Ent. Soc. Lond.*, (Proc.): 19-33, 1850; Strecker, H., *B.*, *Butterflies and moths of N. A.*, p. 247, 1878; Swainson, W., *B.*, *Bib. of Zool.*, p. 225, 1840; Newman, E., *B.*, *Zoologist*, 8: 2886-2889, 1850; Musgrave, A., *Bib. Austr. Ent.*, pp. 175-176, 1932; *A.*, *Cuvier's Animal Kingdom*, 4: iii-vii, 1836; Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, p. 265, 1823; Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930; Kirby, W. & Spence, W., *P.* only, *Introduction to Entomology*, Frontispiece, 1826; Essig, E. O., *B.*, *P.*, *Hist. of Ent.*, pp. 670-672, 1931.
- KIRBY, William Forsell. (1844-1912). *A.*, *Ent. Mo. Mag.*, 49: 19-20, 1913; "H. S.", et al., *P.*, *Ent. News*, 24: 93-96, 1913; Morice, F. D., *Trans. Ent. Soc. Lond.*, (Proc.): clxvi-clxviii, 1912; Rowland-Brown, H., *Entomologist*, 45: 351-352, 1912; Kirby, W. E., *P.*, *Ent. Record*, 24: 314-317, 1912; Musgrave, A., *Bib. Austr. Ent.*, pp. 176-177, 1932; "B. D. J.", *Proc. Linn. Soc. Lond.*, pp. 61-62, 1912-13.
- KIRCHHOFFER, Otto. (1863-1914). *A.*, *Deutsche Ent. Ztschr.*, p. 649, 1914; *A.*, *Ent. News*, 26: 240, 1915.
- KIRCHNER, Leopold Anton. ( -1879). *A.*, *Zool.*, *Anzeiger*, 3: 168, 1880; Stein, R. von, *Ent. Nachr.*, 6: 60-61, 1880; Fitch, E. A., *Entomologist*, 13: 118-119, 1880; *A.*, *Naturaliste*, p. 199, 1880.
- KIRK, Florence Jane. (1897-1935). Donisthorpe, H., *Ent. Record*, 47: 56, 1935.
- KIRKALDY, George Willis. (1873-1910). Bueno, J. R. de la Torre, *Ent. News*, 21: 240-242, 1910; Bueno, J. R. de la Torre, *Can. Ent.*, 42: 97-99, 1910; Dixey, F. A., *Trans. Ent. Soc. Lond.*, (Proc.), pp. lxxxvi-lxxxvii, 1910; Terry, F. W., et al., *Ent. News*, 21: 287-289, 1910; Terry, F. W., *Proc. Ent. Soc. Wash.*, 1: 111-113, 1910; Perkins, R. C. L., *Ent. Mo. Mag.*, 46: 95-96, 1910; Burr, M., *Ent. Record*, 22: 122-124, 1910; *A.*, *P.*, *Entomologist*, 43: 73-74, 1910; Oshanin, B., *Rev. Russe Ent.*, 10: 119-121, 1910; Musgrave, A., *Bib. Austr. Ent.*, pp. 177-178, 1932; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 233, 1937.



- KIRSCH, Theodor Franz Wilhelm. (1818-1889). *A.*, Leopoldina, 25: 169, 1889; *A.*, Ent. Mo. Mag., 25: 402, 1889; Meyer, A. B., *B.*, *P.*, Abh. Zool. Mus. Dresden, 2 (5): 1-7, 1888-89; *A.*, Sitzb. Naturw. Ges. Isis Dresden, July-Dec., p. 36, 1889.
- KIRSCHBAUM, Carl Ludwig. (1812-1880). *A.*, Zool. Anzeiger, 3: 168, 1880; *A.*, Ent. Nachr., 6: 85-87, 1880; Koch, C., Jahrb. Nassau. Ver., 31-32: 324-334, 1878-79; *A.*, Ent. Mo. Mag., 17: 47, 1880; *A.*, Ber. Senckenb. Ges., p. 6, 1879-80; Kraatz, G., Deutsche Ent. Ztschr., 24: 236, 1880; *A.*, Leopoldina, 16: 48, 1880; *A.*, Naturaliste, p. 223, 1880.
- KIRTLAND, Jared Potter. (1793-1877). *A.*, Amer. Nat., 12: 198, 1878; *A.*, Ann. Rpt. Ent. Soc. Ont., 9: 23-24, 1878; *A.*, Can. Ent., 10: 30-32, 1878; *A.*, *P.*, Nat. Cyclop. Amer. Biog., 11: 347-348, 1909; Strecker, H., *B.*, Butterflies and Moths of N. A., pp. 247-248, 1878; "B. S.", Amer. Journ. Sci., (3) 15: 80, 1878; *A.*, Proc. Amer. Acad., 13: 452-453, 1877-78; Osborn, H., *P.*, Fragments Ent. Hist., p. 32, 1937.
- KITE, Vitae. ( -1940). Meiners, E. P., Ent. News, 52: 120, 1941.
- KITZBERGER, Ivan F. (1880-1927). Stepanek, O., Acta Soc. Ent. Cechosl., 24: 44: 1927.
- KLAGES, Eliza. (1835-1919). Klages, E. A., Ent. News, 30: 183, 1919.
- KLAGES, Frederick W. (1859-1886). *A.*, Ent. Amer., 2: 56, 1886.
- KLAGES, Henry G. (1860-1936). Avinoff, A., Ent. News, 48: 29-30, 1937; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 161, 1937.
- KLÄMPFL, Gabriel. ( -1831). Gisl, J., Faunus, 1: 50-51, 1832.
- KLAPÁLEK, Frantisek. (1863-1919). Vimmer, A., *P.*, Acta Soc. Ent. Cechosl., 16: 1-6, 1919; Vimmer, A., *B.*, *P.*, Jubil. Sbornik Cesk. Ent. Spol. 1903-24, pp. 1-2, 1924; Howard, L. O., *P.*, Hist. Applied Ent., 1930.
- KLEE, Waldemar G., (1853-1891). *A.*, West Am. Sci., 7: 114-115, 1890; Essig, E. O., Hist. of Ent., pp. 672-673, 1931.
- KLEIN, J. T., (1846-1904). "H. H. A.", Ent. News, 15: 352, 1904.
- KLENE, Heinrich. (1845-1933). Cermer, J., Natuurh. Maandblad, 22: 143-145, 1933.
- KLICKA, Ladislav. ( -1937). Obenberger, J., *P.*, Acta Soc. Ent. Cechosl., 34: 97-100, 1937.
- KLIMESCH, Josef. (1884-1935). Heikertinger, F., Koleopt. Rundschau, 21: 57, 1935; Horn, W., Arb. phys. angew. Ent. Berlin-Dahlem, 2: 23, 1935.
- KLOCKER, Albert. (1862-1923). Henriksen, K. L., *B.*, *P.*, Ent. Meddel., 14: 449-453, 1925.
- KLUG, Johann Christoph. Friedrich. (1775-1856). Gerstaecker, C. E. A., *B.*, (*P.* in vol. 16, 1885), Stett. Ent. Zeit., 17: 225-237, 1856; Musgrave, A., Bib. Austr. Ent., p. 179, 1932.
- KNAB, Frederick. (1865-1918). *A.*, Ent. News, 29: 400, 1918; Caudell, A. N., et al., *B.*, *P.*, Proc. Ent. Soc. Wash., 21: 41-52, 1919; Howard, L. O., Journ. Econ. Ent., 11: 484-485, 1918; Musgrave, A., Bib. Austr. Ent., p. 179, 1932; Wade, J. S., Proc. Ent. Soc. Wash., 38: 123, 1936; Osborn, H., Fragments Ent. Hist., p. 204, 1937.
- KNAGGS, Henry Guard. (1832-1908). *A.*, Ent. Record, 20: 48, 1908; Walker, J. J., *P.*, Ent. Mo. Mag., 44: 49-51, 1908; Kirby, W. F., Entomologist, 41: 46-47, 1908; Horn, W., Deutsche Ent. Ztschr., p. 428, 1908.
- KNAUS, Warren. (1858-1937). Dean, G. A., *P.*, Journ. Kansas Ent. Soc., 11: 1-3, 1938; Osborn, H., *P.*, Fragments Ent. Hist., pp. 174, 298, 1937.
- KNER, Rudolf. (1810-1869). Kobell, F. von, Sitzb. Bayr. Akad. Wiss. München. 1: 417-418, 1870; Steindachner, F., *P.*, Bot. & Zool. in Oesterr. 1850-1900 Festschr., pp. 414-418, 1901; *A.*, Zool. Garten, 11: 100, 1870.
- KNETZGER, August. (1867-1940). Meiners, E. P., Ent. News, 52: 119, 1941.
- KNIGHT, Hugh. (1877-1943). Quayle, H. J., *P.*, Journ. Econ. Ent., 37: 330-331, 1944.
- KNISCH, Alfred. (1884-1926). Hedicke, H., Deutsche Ent. Ztschr., p. 359, 1926; *A.*, Wien. Ent. Zeit., 43: 194, 1926.
- KNOCH, August Wilhelm. (1742-1818). Zinken, J. L. T. F., Germa's Mag. der Ent., 3: 458-460, 1818.
- KNOCHE, Ernst. (1867-1939). Sachtleben, H., Arb. phys. angew. Ent. Berlin-Dahlem, 6: 315, 1939.

- KNÖRLEIN, Josef. (1806-1883). Munganast, Wien, Ent. Zeit., 2: 80, 1883.
- KNORR, Georg Wolfgang. (1705-1761). Eisinger, F., B., P., Ent. Ztschr., Frankfurt, 43: 241-245, 1930.
- KNOWER, Henry McElderry. (1868-1940). *A.*, Ent. News, 51: 51, 1940.
- KOBERT, R. (1854-1918). *A.*, Science, n. s., 49: 539, 1919.
- KOCH, Gabriel. (1807-1881). *A.*, Ent. Mo. Mag., 17: 240, 1881; *A.*, Leopoldina, 17: 47, 1881; *A.*, Ent. Nachr., 7: 100, 1881.
- KOCH, Ludwig. (1825-1908). Dittrich, R., B., Jahresh. Ver. Schles. Insektenk., 4: xxii-xxv, 1911.
- KOEBELE, Albert. (1852-1924). Howard, L. O., *P.*, Journ. Econ. Ent., 18: 556-562, 1925; Howard, L. O., Mo. Let. Bur. Ent., U. S. Dept. Agr., 131: 1-2 (mimeographed), 1925; Van Duzee, E. P., Proc. Calif. Acad. Sci., Rpt. Dir. of Mus., (4) 15: 530-532, 1926; Fullaway, D. T., et al., Proc. Hawaiian Ent. Soc., 5: 20-28, 1922; Swezey, O. H., et al., *P.*, Proc. Hawaiian Ent. Soc., 6: 339-342, 1926; Perkins, R. C. L., et al., *B. P.*, Hawaiian Planters' Record, 29: 359-376, 1925; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Essig, E. O., *P.*, Hist. of Ent., pp. 673-680, 1931; Osborn, H., *P.*, Fragments Ent. Hist., pp. 191-192, 1937.
- KOELREUTER, Joseph Gottlieb. (1733-1806). Locy, W. A., *P.*, Story of Biol., pp. 411-412, 1925; Nordenskiöld, Erik, Hist. of Biol., pp. 254-257, 1935.
- KOHL, Franz Friedrich. (1851-1924). *A.*, Ent. News, 37: 31-32, 1926; Maidl, F., B., Ann. Naturh. Mus. Wien, 38: 174-179, 1925; Maidl, F., B., *P.*, Konowia, 4: 89-96, 1925; Musgrave, A., Bib. Austr. Ent., p. 180, 1932.
- KÖHLER, Johann Christian Gottlieb. (1759-1833). Schummel, E., Ztschr. Ent. Breslau, 12: 15-24, 1858.
- KOKUEV, Nikitt Rafailovich. (1848-1914). Semenov-Tian-Shanski, A., B., *P.*, Rev. Russe Ent., 16: lv-xx, 1916.
- KOLBE, Hermann Julius. (1855-1939). Sachtleben, H., Arb. morph. taxon. Ent. Berlin-Dahlem, 7: 75-76, 1940; Ohaus, F., B., *P.*, Ent. Blätter, 8: 1-4, 1912; Kuntzen, H., Deutsche Ent. Ztschr., pp. 439-440, 1925.
- KOLLAR, Vincenz. (1797-1860). Schiner, J. R., Wien. Ent. Monatschr., 4: 222-224, 1860; Handlirsch, A., *P.*, Bot. & Zool. in Oesterr. 1850-1900 Festschr., pp. 250, 319, 1901; Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- KÖLLIKER, Rudolph Albert von. (1817-1905). Taschenberg, O., B., Leopoldina, 42: 75-82, 87-91, 103-116, 1906; Nordenskiöld, Erik, *P.*, Hist. of Biol., pp. 400-401, 1935; *A.*, Zool. Anzeiger, 29: 528, 1905.
- KOLTZE, Wilhelm. (1839-1914). *A.*, Deutsche Ent. Ztschr., p. 213, 1915; Horn, W., *P.*, Ent. Mitteil., 4: 1-3, 1915; Meyer, P., Wien. Ent. Zeit., 34: 113-115, 1915; *A.*, Ent. Blätter, 11: 191, 1915.
- KONOW, Friedrich Wilhelm. (1842-1908). *A.*, Ent. News, 19: 348, 1908; Horn, W., *P.*, Deutsche Ent. Ztschr., p. 428, 1908; *A.*, *P.*, Ent. Wochenbl., 25: 67, 1908; Dittrich, R., Jahresh. Ver. Schles. Insektenk., 1: xxxviii-xxxix, 1908; Musgrave, A., Bib. Austr. Ent., p. 181, 1932.
- KOONS, Benjamin Franklin. (1844-1903). *A.*, Ent. News, 15: 112, 1904.
- KOPEC, Stefan. ( - ). *A.*, Nature, 148: 635, 1941.
- KÖPPEN, Fedora Petrovich. (1833-1908). Adelung, N. von, *P.*, Rev. Russe Ent., 8: xv-xviii, 1908; Adelung, N. von, Zool. Anzeiger, 33: 384, 1908.
- KORB, Maximilian. (1851-1933). "H. D.", Ent. Rundschau, 50: 229-233, 1933; *P.*, only, 50 (35), 1933; Wrede, H., Jr., Ent. Ztschr., Frankfurt, 47: 69, 1933; Arnold, E., Mitt. Muench. Ent. Ges., 23: 103-107, 1933.
- KORB, Rosina. ( -1911). Seidlitz, G. von, *P.*, Mitt. Münch. Ent. Ger., 2: 33-38, 1911.
- KORLEVIC, Anton. (1851-1915). *A.*, Wien. Ent. Zeit., 34: 68, 1915; Csiki, E., Rovartani Lapok, 22: 43-44, 60, 1915; *A.*, Ent. Blätter, 11: 128, 1915.
- KOROTNEV, Alekseyei Alekseyevich. ( -1915). Semenov-Tian-Shansky, A. Rev. Russe Ent., 15: 682-683, 1915.
- KOTHE, Albert. (1828-1885). Dimmock, G., Psyche, 5: 36, 1888; Grunack, A., Berlin. Ent. Ztschr., 29: 366, 1885.
- KOTINSKY, Jacob. (1873-1928). Osborn, H., Fragments Ent. Hist., p. 235, 1937.
- KOWARZ, Ferdinand. (1838-1914). *A.*, Ent. News, 26: 240, 1915; Becker, T., B.,

- Deutsche Ent. Ztschr., pp. 1-3, 1915; *A.*, Wien. Ent. Zeit., 34: 68, 1915; Osten-Sacken, C. R., Record of my life and work in entomology, pp. 135-137, 1903.
- KRAATZ, Ernst Gustav. (1831-1909). Semenov-Tian-Shansky, A., Rev. Russe Ent., 9: 341-342, 1909; "K. J.", Ent. Mo. Mag., 46: 21-22, 1910; Hubenthal, W., Ent. Blätter, 5: 237-239, 1909; Horn, W., *P.*, Prof. Dr. Gustav Kraatz . . . zum 50 jährigen Jubiläum, *B.* by R. Zang, 164 pp., 1906; Musgrave, A., Bib. Austr. Ent., p. 181, 1932; Dittrich, R., Jahresh. Ver. Schles. Insekt. Breslau, 3: xxiii-xxv, 1910.
- KRAEPELIN, Karl. 1848-1915). *A.*, Ent. News, 27: 382-383, 1916; *A.*, Wien. Ent. Zeit., 34: 214, 1915; *A.*, Ent. Blätter, 11: 191, 1915.
- KRAMER, Christian Carl. (1732-1764). Henriksen, K. L., Ent. Meddel., 15: 48-51, 1921-22.
- KRAMER, Heinrich. (1872-1935). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 2: 121, 1935.
- KRANCHER, Paul Oskar. (1857-1936). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 300, 1936; *P.* only, Insektenbörse, 50 (41), 1933; *A.*, *P.*, Ent. Ztschr., Frankfurt, 50: 13-14, 1936; Heikertinger, F., Koleopt. Rundschau, 23: 55, 1937.
- KRAUSSE, Anton Hermann.. (1878-1929). Meissner, O., Ent. Ztschr., Frankfurt, 43: 255, 1930; *A.*, *B.* only, Archiv Naturg., 85 A (12): 60-77, 1919; *A.*, Koleopt. Rundschau, 17: 204, 1931; *A.*, Mitt. Deutsch. Ent. Ges., 1: 34, 1930.
- KREFFT, Johann Louis Gerhard. (1830-1880). Whitley, G. G., *P.*, Rec. Austr. Mus., 18: 328, 1932; Musgrave, A., Bib. Austr. Ent., p. 182, 1932.
- KREITHNER, Eduard. (1858-1888). "Rghf.", Wien. Ent. Zeit., 7: 116, 1888.
- KRIECHBAUMER, Joseph. (1819-1902). *A.*, Ent. Mo. Mag., 38: 288-289, 1902; *A.*, Ent. News, 13: 266, 1902; Fowler, W. W., Trans. Ent. Soc. Lond., (Proc.), p. lix, 1902; Konow, F. W., Ztschr. syst. Hym. & Dipt., 2: 273-275, 1902; Taschenberg, O., *B.*, Leopoldina, 38: 60-70, 1902; Musgrave, A., Bib. Austr. Ent., p. 182, 1932.
- KRIZEK, Alexander. (1851-1906). Dittrich, R., Ztschr. Ent. (Breslau), 32: xlix-1, 1907.
- KRÖYER, Henrik Nicolaj. (1799-1870). Henriksen, K. L., *P.*, Ent. Meddel., 15: 204-206, 1926.
- KRULIKOVSKI, Leonida Konstantin. (1864-1930). Sheljuzhko, L. A., *B.*, *P.*, Rev. Russe Ent., 26: 236-245, 1930.
- KRYNICKY, Johann. (1797-1838). Kaleniczenko, M. J., de, *B.*, Bull. Moscou, 12: 25-33, 1839.
- KUBES, P. Augustin. (1862-1924). Sustera, O., Acta Soc. Ent. Cechslav., 21: 41, 1924.
- KUHLMAN, Ludwig. ( -1928). Hepp, A., Ent. Ztschr. Frankfurt, 43: 29, 1929.
- KULCZYNSKI, Wladyslaw (László). (1854-1919). *A.*, Acta Mus. Dzieduszyckicini, 5: 6: 235, 1919-20.
- KÜNCHEL D'HERCULAI, Jules Philippe Alexandre. (1843-1918). Moreau, E., Bull. Soc. Ent. France, p. 265, 1918; *A.*, News, 30: 210, 1919; *A.*, Psyche, 6: 100, 1891 (false report); Perrier, E., et al., Bull. Mus. Hist. Nat. Paris, 25: 11-16, 1919; Pennetier, G., Actes Mus. Hist. Nat. Rouen, 27-28: 549, 1922; *A.*, Ent. News, 2: 122, 1891 (false report); Howard, L. O., Hist. of Applied Ent., pp. 420, 421, 1930.
- KUNZE, Gustav. (1793-1851). Kiesenwetter, E. A. H. von, Stett. Ent. Zeit., 12: 257-260, 1851.
- KURDIUMOFF, N. V. (1882-1917). Borodin, D., *B.*, Journ. Econ. Ent., 14: 377-380, 1921; Howard, L. O., *P.*, Hist. Applied Ent., pp. 299, 300, 301, 303, 1930.
- KUSCHAKEWITSCH, Jacob Alexander. (1826-1866). Kuschakewitsch, A. A., Trudy Soc. Ent. Ross., 4: 3-7, 1868-69.
- KÜSTER, Heinrich Carl. (1807-1876). Crosse, H., et al., Journ. Conchyl., 25: 97, 1877; Kobelt, W., Nachrichtenbl. Deutsch. Malakozool. Ges., 8: 63, 1876; Meyer, F., Nachrichtenbl. Deutsch. Malakozool. Ges., 8: 81-86, 1876; Müller, K., Die Natur, 25: 371, 1876.
- KUWANA, Shinkai Inokichi. (1872-1933). Essig, E. O., *B.*, *P.*, Journ. Econ. Ent., 26:

- 1185-1188, 1933; Howard, L. O., *Hist. of Applied Ent.*, 1930; Osborn, H., *P., Fragments Ent. Hist.*, p. 117, 1937.
- KUWAYAMA, Shigeru. ( -1912). Patch, E. M., *Ent. News*, 23: 288, 1912.
- KUWERT, August Ferdinand. (1829-1894). Kraatz, G., *Deutsche Ent. Ztschr.*, 39: 279, 1895; Tosquinet, J., *Ann. Soc. Ent. Belg.*, 38: 503, 1894; Mik, J., et al., *Wien. Ent. Zeit.*, 13: 260, 1894; Musgrave, A., *Bib. Austr. Ent.*, p. 183, 1932.
- LABILLARDIÈRE, Jacques Julien Houton de. (1755-1834). Mueller, F. von, *P., Pap. & Proc. Roy. Soc. Tasm.*, pp. 334-335, 1885 (1886); Musgrave, A., *Austr. Zool.*, 6: 191-192, 1930; Musgrave, A., *Bib. Austr. Ent.*, pp. 183-184, 1932.
- LABLER, Karl. (1882-1935). Obenberger, J., *P., Acta Soc. Ent. Cechoslov.*, 32: 97-98, 1935; *A., Arb. morph. taxon. Ent. Berlin-Dahlem*, 2: 218, 1935.
- LABOULBÈNE, Jean Joseph Alexandre. (1825-1898). Fairmaire, L., *Ann. Soc. Ent. France*, 75: 63-66, 1906; *A., Ent. Mo. Mag.*, 35: 96, 1899; Blanchard, R., *B., P., Archiv. Parasit.*, 2: 343-355, 1899; Kraatz, G., *Deutsche Ent. Ztschr.*, 43: 222, 1899; Mik, J., *Wien. Ent. Zeit.*, 18: 256, 1899.
- LABRAM, Jonas David. (1785-1852). Burckhardt, F., *B., P., Verh. Naturf. Ges. Basel*, 19 (1): 1-36, 1907.
- LACAZE-DUTHIERS, Félix Josef Henry de. (1821-1901). Pruvot, G., et al., *B., P., Arch. Zool. Exp.*, (3) 10: 1-78, 1902; Locy, W. A., *P., Story of Biol.*, pp. 351-353, 1925; Nordenskiöld, Erik, *Hist. of Biol.*, pp. 425-426, 1935; Fouque, F. A., *C. R. Acad. Paris*, 133: 189-190, 1901; Luanco, R. de, et al., *P., Arch. Zool. Exp.*, (3) 8: i-xxxi, 1900.
- LACÈNE, Antoine Marie Etienne. (1769-1859). Mulsant, E., *B., P., Ann. Soc. Linn. Lyon*, n. s., 7: 273-292, 1860.
- LACERDA, Antonio de. (1834-1885). Dimmock, G., *Psyche*, 5: 36, 1888; Ragonot, E. L., *Ann. Soc. Ent. France*, (6) 5, (Bull.): clxxiii, 1885.
- LACKSCHWITZ, Paul. (1865-1936). Edwards, F. W., *Entomologist*, 69: 195-196, 1936; *A., Arb. morph. taxon. Ent. Berlin-Dahlem*, 3: 151, 1936; Lindner, E., *B., P., Kenowia*, 15: 171-175, 1936.
- LACORDAIRE, Jean Theodore. (1801-1870). Kraatz, G., *Berlin. Ent. Ztschr.*, 14: viii-ix, 1870; Wallace, A. R., *Trans. Ent. Soc. Lond.*, (Proc.): xlv-xlvii, 1870; *A., Ent. Mo. Mag.*, 7: 89-90, 1870; *A., Pet. Nouv. Ent.*, 2: 107, 1870; Morren, E., *B., P., Mem. Soc. Roy. Sci. Liège*, (2) 3: xxi-xl, 1873; Candèze, E. C. A., *B., P., Ann. Acad. Belg.*, 38: 139-160, 1872; Musgrave, A., *Bib. Austr. Ent.*, p. 184, 1932; Oberthür, C., *P., Études Léop. Comp.*, 11: unpagéd, 1916.
- LA FERTÉ-SÉNECTÈRE, F. Thibault de la Carte de. (1808-1886). Reiche, L., *Ann. Soc. Ent. France*, (6) 6, (Bull.): lxvii, 1886.
- LAHARPE, Jean Jaques Charles. (1802-1877). *A., Act. Soc. Helvet. Sci. Nat.*, 60th Sess. 1877, pp. 293-304, 1878.
- LAHILLE, Fernando. (1861-1940). *A., Rev. Soc. Ent. Arg.*, 10: 340, 1940; Porter, C. E., *B., P., Rev. Chilena Hist. Nat.*, 44: 266-268, 1940; Birabén, M., *B., P., Rev. Mus. La Plata, Secc. Ofic.*, pp. 134-148, 1941; Fesquet, A. E. J., *P., An. Soc. Cient. Arg.*, 130: 221-229, 1940.
- LAICHTARTING, Johann Nepomuk. (1754-1797). *A., B., Ztschr. Tirol & Vorarlberg*, 8: 186-224, 1834; Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, p. 258, 1823.
- LAMARCK, Jean Baptiste Pierre Antoine de Monet de. (1744-1829). Jackson, R. T., *Psyche*, 12: 36-38, 1905; "E. F.", *Ent. Ztschr.*, Frankfurt, 43: 214, 1929; Packard, A. S., *P., "Lamarck, his life and work,"* 451 pp., 1901; Courvoisier, L. G., *Feuille ieu. Nat.*, 2: 21-22, 1871-72; Musgrave, A., *Bib. Austr. Ent.*, p. 185, 1932; Nordenskiöld, Erik, *P., Hist. of Biol.*, pp. 316-330, 1935; *A., Amer. Nat.*, 36: 495-497, 1902; Perrier, E., et al., *P., Bull. Mus. Paris*, 15: 290, 293-321, 1909.
- LAMB, Charles George. ( - ). Blair, K. G., *Proc. Roy. Ent. Soc. Lond.* (C) 6: 41, 1941-42.
- LAMBIN, Charles. (1822-1885). Dimmock, G., *Psyche*, 5: 36, 1888; Ragonot, E. L., *Ann. Soc. Ent. France*, (6) 5, (Bull.): clxxii, 1885.

- LAMBOTTE, Henri Antoine. (1816-1873). Denis, H., *B., P., Ann. Soc. Malacol. Belg.*, 8: i-xxiv, 1873.
- LAMPA, Sven. (1839-1914). *A., Ent. News*, 27: 384, 1916; Böving, A., *Journ. Econ. Ent.*, 9: 242, 1916; Palmen, J. A., *Medd. Soc. Fauna et Flora Fenn.*, 41: 104-105, 1915; Aurivillius, C., *B., P., Ent. Tidskr.*, 36: 268-281, 1915; Howard, L. O., *P., Hist. of Applied Ent.*, 1930.
- LANDOIS, Hermann. (1835-1905). *A., P., Insekten-Börse*, 22: 21, 1905; Reeker, H., *B., P., Jahresb. Westfäl. Prov.-Ver., Zool. Sekt.*, 33: 9-17, 1904-05.
- LANGHOFFER, August. (1861-1940). *A., Zool. Anzeiger*, 130: 159, 1940; Howard, L. O., *P., Hist. of Applied Ent.*, 1930.
- LANKESTER, Edwin. (1814-1874). "J. F. P.", *Journ. Micro. Sci.*, n. s., 15: 59-62, 1875.
- LANKESTER, Edwin Ray. (1847-1929). Harmer, S. F., *Proc. Linn. Soc. Lond.*, pp. 200-211, 1929-30.
- LANTZ, David Ernest. (1855-1918). *A., Ent. News*, 29: 400, 1918.
- LAPORTE, Francois Louis. (See under Castelnau).
- LAPOUGE, Georges Vacher de. (1854-1936). *A., Arb. morph. taxon. Ent. Berlin-Dahlem*, 3: 300, 1936; *A., Koleopt. Rundschau*, 23: 56, 1937.
- LAREYNIÉ, Philippe. (1826-1857). Fairmaire, L., *Ann. Soc. Ent. France*, (3) 7: 261-266, 1859.
- LARSEN, Carl C. R. (1846-1920). Kryger, J. P., *P., Ent. Meddel.*, 13: 225-230, 1920.
- LARTIGNE, Henri. (1830-1884). Lévillé, A., *Ann. Soc. Ent. France*, (6) 4: 365-366, 1884.
- LAßS, Hermann. (1859-1938). *A., Arb. morph. taxon. Ent. Berlin-Dahlem*, 5: 296, 1938.
- LATHY, Percy I. ( -1943). Talbot, G., *Entomologist*, 76: 263-264, 1943.
- LATREILLE, Pierre André. (1762-1833). *A., Cuvier's Animal Kingdom*, 4: i-ii, 1836; *A., Nat. Can.*, 11: 61, 1879; Nussac, L. de, *P., Biog. pub. by Steinheil, Paris*, pp. 1-264, 1907; Jardine, W., *B., P., Nat. Lib.*, 32 (Ent. 7): 17-60, 1845-46; Swainson, W., *Bib. of Zool.*, pp. 233-237, 1840; *A., P., Insecta*, 3 (25): 21-22, 1913; Hagen, H. A., *B., Bib. Ent.*, 1: 451-456, 1862; Geoffroy Saint-Hilaire, E., et al., *Ann. Soc. Ent. France*, 2 (Bull.): xviii-xxxi, 1833; Walckenaer, C. A. de, *Ann. Soc. Ent. France*, 4 (Bull.): xxiii-xxix, 1835; Lefebvre, A., *Ann. Soc. Ent. France*, 4 (Bull.): xcvi-civ, 1835; Duméril, A. M. C., *B., Consid. Gén. sur la Classe des Ins.*, pp. 259-261, 1823; Musgrave, A., *Bib. Austr. Ent.*, pp. 187-188, 1932; Howard, L. O., *P., Hist. Applied Ent.*, 1930.
- LAURENT, Philip. ( -1942). *A., Ent. News*, 53: 227, 1942.
- LAVERAN, Alphonse. (1845-1922). Howard, L. O., *P., Hist. of Applied Ent.*, 1930.
- LAZEAR, Jesse William. (1866-1900). Howard, L. O., *P., Hist. of Applied Ent.*, 1930.
- LEA, Arthur Mills. (1868-1932). Walker, J. J., *Ent. Mo. Mag.*, 68: 119, 1932; Wilson, F. E., *P., Victoria Nat.*, 49: 15-18, 1932; Musgrave, A., *B., Austr. Mus. Mag.*, 4: 342, 1932; Hale, H. M., *P., Trans. & Proc. Roy. Soc. So. Austr.*, 56: 1-2, 1932.
- LEACH, Frank A. ( -1929). Davis, J. J., *Ann. Ent. Soc. Amer.*, 24: 187, 1931.
- LEACH, John Arthur. (1870-1929). Croll, R. H., et al., *Emu*, 29: 230-233, 1930; Iredale, T., *Austr. Zool.*, 6: 176-177, 1930; Musgrave, A., *Bib. Austr. Ent.*, p. 196, 1932.
- LEACH, William Elford. (1790-1836). Dow, R. P., *Bull. Bklyn. Ent. Soc.*, 8: 74, 1913; Hope, F. W., *Ann. Soc. Ent. France*, 6 (Bull.): xxxiv-xxxv, 1837; Swainson, W., *Bib. of Zool.*, pp. 237-240, 1840; *A., Mag. Nat. Hist.*, 1: 390, 1837; Musgrave, A., *B., Bib. Austr. Ent.*, p. 196, 1932.
- LEADER, Benjamin John. (1914-1942). "N. A. W.", *Entomologist*, 76: 88, 1943.
- LE BARON, William. (1814-1876). *A., Amer. Nat.*, 11: 56, 1877; Forbes, S. A., *B., P., Ann. Rpt. Ill. State Ent.*, 17, (Appendix): 1-36, 1890; Goding, F. W., *B., Ent. Amer.*, 1: 122-125, 1885; Smith, J. B., *P., Pop. Sci. Mo.*, 76: 476, 1910; Goding, F. W., *P., Trans. Ill. St. Hort. Soc.*, 20: 176-178, 1886; Osten-Sacken, C. R., *Record of my life and work in entomology*, pp. 39-40, 1903; Howard, L. O., *P., Hist. Applied Ent.*, 1930; Osborn, H., *P., Fragments Ent. Hist.*, p. 221, 1937.

- LEBERT, Hermann. (1813-1878). *A.*, Zool. Anzeiger, 1: 228, 1878; *A.*, Jahresb. Nat. Ges. Graubünden, 22: xxvi-xxviii, 1879.
- LECLERC, Eugene Alexandre. ( -1868). Liégard, Léon, Bull. Soc. Linn. Normandie, (2) 3: 285-289, 1869.
- LE CONTE, John Eatton. (1784-1860). *A.*, Amer. Journ. Sci., (2) 31: 303, 462-463, 1861; *A.*, Ent. News, 22: 276-277, 1911; Barnhart, J. H., Amer. Midland Nat., 5: 135-138, 1917; Graham, M., et al., Pittonia, 1: 303-311, 1889; Gray, A., Bot. Gaz., 8: 197-199, 1883; Harshberger, J., Botanists of Phila., pp. 149-151, 1899; Strecker, H., Butterflies and Moths of N. A., p. 211, 1878; Sharswood, W., (trans. by C. A. Dohrn), Stett. Ent. Zeit., 22: 166-169, 1861.
- LE CONTE, John Lawrence. (1825-1883). *A.*, Ann. Rpt. Ent. Soc. Ont., 14: 83, 1883; *A.*, Can. Ent., 15: 217-218, 1883; *A.*, P., Ent. News, 4: 185, 1893; *A.*, P., Pop. Sci. Mo., 5: 513, 1874; *A.*, Proc. Amer. Acad. Arts & Sci., 19: 511-516, 1884; Benjamin, M., Proc. Amer. Assoc. Adv. Sci., 48: 450-452, 1899; Benjamin, M., Science, 10: 761-762, 1899; Dow, R. P., Journ. N. Y. Ent. Soc., 22: 185-191, 1914; Edwards, H., Papilio, 3: 168-169, 1883; Henshaw, S., Dimmock's Sp. Bib., 1: 1-11, 1878; Horn, G. H., et al., Proc. Amer. Phil. Soc., 21: 290-299, 1884; Horn, G. H., P., Science, 2: 783-786, 1883; McLachlan, R., Nature, 29: 128, 1883-84; Parry, C. C., Proc. Davenport Acad. Sci., 4: 229-230, 1885; Riley, C. V., Psyche, 4: 107-110, 1883; Schaupp, F. G., B., P., Bull. Bklyn. Ent. Soc., 6: i-ix, 1884; Scudder, S. H., Nat. Acad. Sci. Biog. Mem., 2: 261-293, 1886; Scudder, S. H., P., Trans. Amer. Ent. Soc., 11: pp. i-xxviii, 1884; Sharp, D., Ent. Mo. Mag., 20: 191-192, 1884; Smith, J. B., P., Pop. Sci. Mo., 76: 469, 1910; True, F. W., Hist. First Half Cent. Nat. Acad. Sci., pp. 156-158, 1913; Salle, A., Ann. Soc. Ent. France, (6) 3: 571-576, (Bull.): cxxx, 1883; Scudder, S. H., P. (vol. 2), Butterflies Eastern U. S. & Canada, 1: 654-656, 1889; Horn, G. H., P., Rev. d'Ent., 3: 271-277, 1884; *A.*, Amer. Journ. Sci., (3) 26: 490, 1883; Dunning, J. W., Trans. Ent. Soc. Lond., (Proc.), pp. xliii-xliv, 1883; Howard, L. O., P., Hist. Applied Ent., 1930; Essig, E. O., P., Hist. of Ent., pp. 680-685, 1931; Osborn, H., P., Fragments Ent. Hist., pp. 163-164, 1937.
- LEDERER, Julius. (1821-1870). *A.*, Stett. Ent. Zeit., 32: 179-183, 1871; Strecker, H., B., Butterflies & Moths of N. A., p. 248, 1878; Rebel, H., P., Bot. & Zool. in Oesterr. 1850-1900 Festschr., pp. 320-322, 1901; Kraatz, G., Berl. Ent. Ztschr., 14: ix-x, 1870; *A.*, Ent. Mo. Mag., 7: 19, 1870-71; *A.*, Pet. Nouv. Ent., 2: 89, 1870.
- Le DOUS, Carl Philip Emil. (1866-1936). Henriksen, K. L., P., Ent. Meddel., 20: 102-103, 1938.
- LEECH, John Henry. (1862-1900). *A.*, B., P., Entomologist, 34: 33-38, 1901; *A.*, Ent. Mo. Mag., 37: 49-50, 1901.
- LEEUWENHOEK, Antony van. (1632-1723). Becking, L. B., P., Sci. Mo., 18: 547-554, 1924; Miall, L. C., Early Naturalists, their lives and work, pp. 200-223, 1912; Weiss, H. B., et al., Journ. N. Y. Ent. Soc., 36: 99-104, 1928; Müller, K., P., Natur, n. s., 1: 327-328, 1875; Harris, D. F., Sci. Mo., 12: 150-160, 1921; Creplin, C. H., Isis, 40: 915-926, 1847; *A.*, Natur, 25: 462-464, 479-483, 1876; Locy, W. A., P., Story of Biol., pp. 206-218, 250-255, 1925; Nordenskiöld, Erik, P., Hist. of Biol., pp. 164-167, 1935; Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., p. 246, 1823.
- LEFÈBRE DE CERISY, Louis Charles. (1789-1864). *A.*, Rev. Mag. Zool., (2) 16: 412, 1864; Caieu, A. de, Mem. Soc. d'Emul. Abbeville, 10: 688-704, 1867.
- LEFEBVRE, Alexandre Louis. (1798-1867). Desmarest, E., B., Ann. Soc. Ent. France, (4) 8: 877-884, 1868; Targioni-Tozzetti, A., et al., Bull. Soc. Ent. Ital., 2: 100, 1870; Musgrave, A., Bib. Austr. Ent., p. 197, 1932.
- LEFÈVRE, Edouard. (1839-1894). Fairmaire, L., B., P., Ann. Soc. Ent. France, 64: 121-126, 1895; Musgrave, A., Bib. Austr. Ent., p. 197, 1932.
- LEFROY, Harold Maxwell. (1877-1925). *A.*, Entomologist, 58: 279-280, 1925; *A.*, Ent. Mo. Mag., 61: 259-260, 1925; *A.*, Ent. News, 37: 94-95, 1926; Ballou, H. A., Trop. Agr., Trinidad, 3: 9, 1926; Felt, E. P., Journ. Econ. Ent., 18: 848-849, 1925; Musgrave, A., Bib. Austr. Ent., p. 197, 1932; *A.*, Journ. Bombay N. H. Soc., 30: 899-900, 1926; Howard, L. O., P., Hist. of Applied Ent., 1930.



- LEHMANN, Martin Christian Gottlieb. (1775-1856). Henriksen, K. L., *P.*, Ent. Meddel., 15: 218-220, 1926.
- LEICHARDT, Friedrich Wilhelm Ludwig. (1813-1848). Musgrave, A., Austr., Zool., 6: 197, 1930; Musgrave, A., Bib. Austr. Ent., p. 197, 1932.
- LEIDY, Joseph. (1823-1891). *A.*, Amer. Journ. Sci., (3) 41: 523-525, 1891; *A.*, Amer. Nat., 25: 408-410, 1891; *A.*, Ent. News, 2: 128, 1891; Chapman, H. C., Science, n. s., 26: 812-815, 1907; Minot, C. S., Science, n. s., 37: 809-814, 1913; Morse, E. S., Sci. Mo., 18: 422-439, 1924; Nolan, E. J., *P.*, Pop. Sci. Mo., 17: 684-691, 1880; Ward, H. B., et al., *P.*, Proc. Acad. Nat. Sci. Phila., 1923, with Append., 75: 1-87, 1924.
- LEITGER, Hubert. (1835-1888). Wettstein, R. von, *P.*, Bot. & Zool. in Oesterr. 1850-1900 Festschr., p. 200, 1901.
- LEMBERT, John B. (1840-1896). *A.*, Ent. News, 7: 224, 1896; Bethune, C. J. S., Can. Ent., 28: 217-218, 1896.
- LEMMER, Frederick. (1876-1941). Engelhardt, G. P., *P.*, Bull. Bklyn. Ent. Soc., 37: 4-5, 1942.
- LENG, Charles William. (1859-1941). *A.*, Journ. Econ. Ent., 34: 131, 1941; *A.*, Journ. N. Y. Ent. Soc., 49: 100, 1941; Sherman, J. D., Journ. N. Y. Ent. Soc., 49: 185-187, 1941; Davis, W. T., *P.*, Journ. N. Y. Ent. Soc., 49: 189-192, 1941; Usinger, R. L., Pan-Pacific Ent., 17: 84, 1941; Davis, W. T., *P.*, Bull. Bklyn. Ent. Soc., 36: 45-49, 1941; *A.*, Rev. Ent. (Rio de J.), 12: 1-2, 1941; *B.*, only, Leng's Cat. Coleopt. of N. A., pp. 367-444, 1920; (with A. J. Mutchler) 1st suppl., pp. 57-72, 1927; (with Mutchler) 2nd and 3rd suppl., pp. 55-76, 95-102, 1933; Osborn, H., *P.*, Fragments Ent. Hist., pp. 183-184, 1937.
- LENZ, Harald Othmar. (1799-1870). *A.*, Zool. Garten, 11: 100, 1870.
- LEONARDI, Gustavo. (1869-1918). Silvestri, F., Ent. News, 29: 360, 1918; Silvestri, F., *B.*, *P.*, Boll. Lab. Zool. Gen. Agr. Portici, 11: 291-298, 1916 (1918); Howard, L. O., *P.*, Hist. of Applied Ent., pp. 249, 252, 253, 258, 259, 1930; Musgrave, Bib. Austr. Ent., p. 198, 1932.
- LEONHARD, Otto. (1853-1929). Horn, W., *P.*, Ent. Blätter, 25: 113-114, 1929.
- LE PELETIER, Amédée Louis Michel. (1770-1845). Swainson, W., Bib. of Zool., p. 241, 1840; Serville, J. G. A., *B.*, Ann. Soc. Ent. France, (2) 4: 193-200, 1840; Musgrave, A., Bib. Austr. Ent., p. 198, 1932.
- LEPRIEUR, Charles Eugène. (1815-1893). Saulcy, F. de B., *P.*, Ann. Soc. Ent. France, 63: 453-458, 1894.
- LEREBoullet, Auguste. (1804-1865). *A.*, Amer. Journ. Sci., (2) 41: 110, 1866.
- LE ROI, Otto. ( -1916). Hedicke, H., Deutsche Ent. Ztschr., p. 326, 1917.
- LESPEs, Pierre Gabriel Charles. (1827-1872). *A.*, Journ. Zool., 1: 400, 1872; Fauvel, A., Annuaire Ent., 1: 106, 1873.
- LESSON, René Primevère. (1794-1849). Swainson, W., *B.*, Bib. of Zool., pp. 241-243, 1840; Musgrave, A., Bib. Austr. Ent., p. 199, 1932.
- LETHIERRY, Lucien Francois. (1830-1894). Puton, A., Rev. d'Ent., 13: 118-119, 1894; *A.*, Ent. News, 5: 236, 1894; Kraatz, Deutsche Ent. Ztschr., 39: 279, 1895; *A.*, Wien. Ent. Zeit., 13: 195, 1894.
- LETZNER, Karl. (1812-1889). Gerhardt, J., *P.*, Deutsche Ent. Ztschr., 34: 28-29, 1890.
- LEUCKART, Karl Georg Friedrich Rudolf. (1822-1898). Sitzb. Ges. Beförd. Naturw. Marburg, no. 2: 57-59, 1898; Kellogg, V. L., Psyche, 8: 214-215, 1898; Zürn, F. A., Ztschr. Tiermed., 2: 235-237, 1898; Blanchard, R., *P.*, Arch. Parasitol., 1: 185-190, 1898; *A.*, *P.*, Insektenbörse, 15: 37, 1898; Taschenberg, O., *B.*, Leopoldina, 34: 62-66, 82-94, 102-112, 1899; *A.*, Nature, 57: 542, 1898; Grobben, C., Verh. zool.-bot. Ges. Wien, 48: 241-243, 1898; Hanstein, R. von, Naturw. Rundschau, 13: 242-246, 1898; Butschli, O., Zool. Centralbl., 6: 264-266, 1899; Carus, J. V., Ber. Verh. Kgl. Sächs. Ges. Wiss. Leipzig, Math.-Phys. Cl., 50: 49-62, 1898; Voigt, C., Sitzb. Math.-Phys. Cl. Bayr. Akad. Wiss. München, pp. 471-475, 1898; Jacobi, A., *P.*, Centralbl. Bacteriol. & Parasitenk., Abt. 1, 23: 1073-1081, 1898; Krancher, O., *P.*, Deutsche Bienenfreund, 34: 50-52, 1898; Marchand, F., Sitzb. Ges. Beförd. Naturw. Marburg, no. 2, 1898; Locy, W. A., *P.*, Story of Biol., pp. 327-331, 1925; Norden-skiöld, Erik, Hist. of Biol., pp. 421-422, 1935.



- LEUNIS, Johannes. (1832-1873). Schenkling-Prévoit, C., *Insekten-Börse*, 19: 185-187, 1902; Keese, C., *Leopoldina*, 8: 82-85, 1873.
- LEUSSLER, R. A. (1866-1943). *A.*, *Ent. News*, 54: 242, 1943.
- LÉVEILLÉ, Albert. ( -1911). Semenov-Tian-Shanskij, A., *Rev. Russe Ent.*, 12: 636, 1912; Janet, A., *Bull. Soc. Ent. France*, pp. 25-26, 1911.
- LEVYRAT, Jean Nicolas Barthelemy Gustave. (1823-1859). Millière, P., *Ann. Soc. Ent. France*, (3) 8; (*Bull.*): xviii, 1860; Mulsant, E., *P.*, *Ann. Soc. Linn. Lyon*, n. s., 6: 107-118, 1860.
- LEWES, George Henry. (1817-1878). *A.*, *Zool. Anzeiger*, 1: 372, 1878; *A.*, *Nature*, 19: 106-107, 1879.
- LEWIN, John William. (1770-1819). Swainson, W., *Bib. of Zool.*, pp. 247-248, 1840; Froggatt, W. W., *Austr. Nat.*, 8: 1-3, 1930; Musgrave, A., *Austr. Zool.*, 6: 192-193, 1930; Musgrave, A., *Bib. Austr. Ent.*, p. 200, 1932.
- LEWIS, Clarence Waterman. (1882-1936). Hyslop, J. A., *Journ. Econ. Ent.*, 29: 1030, 1936; Freeman, W. H., *Journ. Econ. Ent.*, 30: 221, 1937; *A.*, *Arb. physiol. angew. Ent. Berlin-Dahlem*, 4: 159, 1937.
- LEWIS, George. (1839-1926). *A.*, *Ent. News*, 38: 96, 1927; Arrow, G. J., *Ent. Mo. Mag.*, 62: 242, 270, 1926; *A.*, *Ent. Record*, 38: 144, 1926; Poulton, E. B., *Proc. Ent. Soc. Lond.*, 1: 75, 1926; Edwards, S., *Proc. Linn. Soc. Lond.*, pp. 89-90, 1926-27.
- LEYDIG, Franz von. (1821-1908). Nussbaum, M., *Anat. Anzeiger*, 32: 503-506, 1908; Zacharias, O., *Arch. Hydrobiol.*, 4: 77-82, 1908; Lory, W., *P.*, *Story of Biol.*, pp. 273-274, 1925; Nordenskiöld, Erik, *Hist. of Biol.*, p. 401, 1935; Hanstein, R. von, *Naturw. Rundschau*, 23: 347-351, 1908; Schultze, O., *P.*, *Münch. Med. Wochenschr.*, 55: 972-973, 1908; *A.*, *Zool. Anzeiger*, 33: 32, 1908.
- LICHTENSTEIN, Wilhelm Auguste Jules. (1818-1886). *A.*, *Ent. Mo. Mag.*, 23: 216, 1887; McLachlan, R., *Trans. Ent. Lond.*, (*Proc.*): lxxi-lxxvii, 1886; Mayet, V., *B.*, *Ann. Soc. Ent. France*, (6) 7: 49-58, 1887.
- LIEBIG, Justus von. (1803-1873). *A.*, *Leopoldina*, 8: 67-75, 1873; Nordenskiöld, Erik, *Hist. of Biol.*, pp. 448-449, 1935.
- LIEGEL, Emanuel. (1859-1894). *A.*, *Ent. News*, 5: 160, 1894.
- LINCECUM, Gideon. (1792-1874). *A.*, *Amer. Nat.*, 9: 191, 1875; *A.*, *Nature*, 11: 237, 1875; Geiser, S. W., *Southwest Review*, 15: 93-111, 1930; Geiser, S. W., *Field & Lab.*, 4: 49, 1936.
- LINDEMAN, Karl. (1844-1929). Howard, L. O., *P.*, *Hist. Applied Ent.*, 1930.
- LINDER, Jules. (1830-1869). Deyrolle, E., *Petit. Nouv. Ent.*, 1: 28, 1869; Kraatz, G., *Berlin. Ent. Ztschr.*, 13: iv, 1869.
- LINDLEY, John. (1799-1865). *A.*, *Proc. Roy. Soc. Lond.*, pp. xxx-xxxii, 1866-67.
- LINELL, Martin Larsson. (1849-1897). Chittenden, F. H., *Ent. News*, 8: 159-160, 1897; Schwarz, E. A., *B.*, *Proc. Ent. Soc. Wash.*, 4: 177-180, 1901; *A.*, *Leopoldina*, 33: 113, 1897; Osborn, H., *Fragments Ent. Hist.*, pp. 222-223, 1937.
- LINKOLA, Jussi. (1911-1938). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 6: 69, 1939; Savas, O. E., *Ann. Ent. Fenn.*, 4: 186-187, 1938.
- LINNÉ, Carl von. (1707-1778). Dohrn, C. A., *Stett. Ent. Zeit.*, 30: 411-425, 1869; 31: 90-97, 1870; 32: 354-370, 1871; 33: 446-462, 1872; 35: 374-386, 1874; 41: 250-255, 333-351, 1880; 42: 195-213, 1881; *A.*, *Proc. Linn. Soc. Lond.*, 5: 5-12, 1848; Müller, K., *P.*, *Natur*, 3: 113-116, 1854; Coquillett, D. W., *Proc. Ent. Soc. Wash.*, 7: 66-68, 1905; Jackson, B. D., *P.*, *Proc. Linn. Soc. Lond.*, pp. 56-61, 1910-11; *A.*, *Leopoldina*, 43: 44-47, 1907; Sachse, C. T., *Allgem. Deutsche Naturh. Zeit.*, 2: 449-459, 1847; Locy, W. A., *P.*, *Story of Biol.*, pp. 310-321, 364-368, 1925; Nordenskiöld, Erik, *P.*, *Hist. of Biol.*, pp. 203-218, 1935; Fabricius, J. C., *Deutsches Mus.*, 1: 431-441, 2: 39-48, 1780 (facsimile rep. by Julius Schuster, *P.*, Berlin, 1928); Jackson, Benj. D., *P.*, *Linnaeus, story of his life* (London), pp. 1-416, 1923; Fée, A. L. A., *B.*, *P.*, *Mem. Soc. Sci. Lille*, 1: i-xi, 1-379, 1831 (1832); Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, p. 248, 1823; Greene, E. L., et al., *Proc. Wash. Acad. Sci.*, 9: 241-274, 1907; Greene, E. L., *Proc. Wash. Acad. Sci.*, 11: 17-26, 1909; Carruthers, W., *P.*, *Proc. Linn. Soc. Lond.*, pp. 59-76, 1905-06; Schödte, J. G., *Naturh. Tidsskr.*, (3) 7: 333-

- 522, 1871; Osborn, H., *P.*, *Fragments Ent. Hist.*, 1937; Harms, H., *P.*, *Naturw. Wochenschr.*, 22: 305-312, 1907.
- LINTNER, Joseph Albert. (1822-1898). *A.*, *P.*, *Albany Evening Journ.*, 57: 3, 1886; *A.*, *Entomologist*, 31: 174-175, 1898; *A.*, *P.*, *Ent. News*, 9: 129-130, 1898; *A.*, *P.*, *Nat. Cyclop. Amer. Biog.*, 5: 260, 1907; Felt, E. P., *B.*, *P.*, *Bull. N. Y. State Mus.*, 5: 301-400, 1899; Howard, L. O., *Insect Life*, 7: 63, 1894; Slingerland, M. V., *Ann. Rpt. Ent. Soc. Ont.*, 29: 106-107, 1898; Slingerland, M. V., *Can. Ent.*, 30: 165-166, 1898; Smith, J. B., *P.*, *Pop. Sci. Mo.*, 76: 477, 1910; Goding, F. W., *P.*, *Trans. N. Y. St. Agr. Soc.*, 50th Ann. Rpt. 1890, pp. 361-363, 1891; Howard, L. O., *P.*, *Hist. Applied Ent.*, 1930; Osborn, H., *P.*, *Fragments Ent. Hist.*, 1937.
- LIOY, Paolo. (1836- ). Schmitz, H., *III Internat. Ent. Kong. Zurich*, 1925, 1: 39-40, 1926.
- LISTER, Joseph Jackson. (1857-1927). Collin, J. E., *Proc. Ent. Soc. Lond.*, 2: 104-105, 1927; "S. J. H.", *Nature*, 119: 360, 1927; "F. J. H.", *P.*, *Proc. Roy. Soc. Lond.*, (B) 102: i-v, 1927-28.
- LISTER, Martin. (1638-1712). Miall, L. C., *Early Naturalists, their lives and work*, pp. 130-134, 1912; Swainson, W., *Bib. of Zool.*, pp. 254-256, 1840; Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, pp. 245-246, 1823.
- LISTO, Jaako. (1900-1935). Tullgren, A., *Ent. Tidskr.*, 56: 190-191, 1935; Nordman, A., *P.*, *Notulae Ent.*, 16: 25-26, 1936; Nordman, A., *P.*, *Mem. Soc. Fauna Flora Fenn.*, 12: 219-220, 235-236, 1935-36; Hukkinen, Y., *P.*, *Agr. Exp. Activities of State, (Finland)*, pub. no. 99, pp. 5-6, 1939.
- LITTLE, William. ( -1867). Newman, E., *Entomologist*, 3: 248b, 1867.
- LITTLER, Frank Mervyn. (1880-1922). *A.*, *Emu*, 22: 158, 1922; Musgrave, A., *Bib. Austr. Ent.*, p. 202, 1932.
- LJUNGH, Sven Ingemar. (1757-1828). *A.*, *B.*, *Vetensk. Acad. Handl.*, 1828, pp. 279-282, 1829.
- LOCHHEAD, William. (1864-1927). *A.*, *P.*, *Journ. Ent.*, 21: 238, 1928; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 205, 1937.
- LOCY, William Albert. (1857-1924). Calvert, P. P., *Ent. News*, 35: 380, 1924; *A.*, *Science*, 60: 356, 1924.
- LÖDING, Henry Peter. (1869-1942). Engelhardt, G. P., *P.*, *Bull. Bklyn. Ent. Soc.*, 37: 50-51, 1942.
- LOEB, Jacques. (1859-1924). *A.*, *Ent. News*, 35: 142-143, 1924; Levene, P. A., *Science*, n. s., 59: 427-430, 1924.
- LOEW, Franz. (See under Franz Löw).
- LOEW, Hermann. (1807-1878). *A.*, *Ent. Mo. Mag.*, 16: 46, 1879; Sterne, C., *Deutsche Ent. Ztschr.*, 23: 419-423, 1879; Osten-Sacken, C. R., *P.*, *Record of my life work in entomology*, pp. 29-35, 44-45, 99-137, 144-153, 158-164, 1903; Osten-Sacken, C. R., *B.*, *Verh. zool.-bot. Ges. Wien*, 34: 455-464, 1884; *A.*, *Ent. Nachr.*, 5: 146, 1879; *A.*, *Amer. Nat.*, 13: 798, 1879; *A.*, *Zool. Anzeiger*, 2: 336, 1879; Kowarz, F., *Verh. zool.-bot. Ges. Wien*, 29 (Sitzb.): 45-47, 1879; *A.*, *Ber. Senckenb. Ges.*, p. 7, 1878-79; Musgrave, A., *Bib. Austr. Ent.*, p. 202, 1932; *A.*, *Naturaliste*, 1: 63, 1879; Speiser, P., *Ent. Wochenbl.*, 24: 129-130, 1907; Essig, E. O., *B.*, *P.*, *Hist. of Ent.*, pp. 691-694, 1931; Osborn, H., *P.*, *Fragments Ent. Hist.*, 1937.
- LÖFGREN, Gustaf. (1848-1910). "S. B.", *P.*, *Ent. Tidskr.*, 37: 108-109, 1911.
- LÖFGREN, Väinö Armas. (1894-1940). Kangas, E., *Ann. Ent. Fenn.*, 6: 79-80, 1940.
- LOGAN, Robert Francis. (1827-1887). *A.*, *Ent. Mo. Mag.*, 24: 92-93, 1887.
- LOKAY, Emanuel. (1823-1880). Stein, R. von, *Ent. Nachr.*, 6: 257-258, 1880.
- LOKAY, (LOKAY), Emanuel. ( -1928). Obenberger, J., *B.*, *P.*, *Acta Soc. Ent. Cechosl.*, 25: 127-130, 1928.
- LOMNICKI, Martin von. (1844-1915). Soldanski, H., *Deutsche Ent. Ztschr.*, p. 88, 1916.
- LONGSTAFF, George Blundell. (1849-1921). Image, S., et al., *Ent. Mo. Mag.*, 57: 157-161, 1921; "B. D. J.", *Proc. Linn. Soc. Lond.*, p. 50, 1920-21; Rothschild, L. W., *Trans. Ent. Soc. Lond.*, (Proc.): cxxviii-cxxix, 1921; Musgrave, A., *Bib. Austr. Ent.*, p. 202, 1932.
- LOOMIS, Henry. (1839-1920). *A.*, *Ent. News*, 31: 240, 1920.
- LOPEZ, Alonzo William. (1900-1932). Essig, E. O., *B.*, *Journ. Econ. Ent.*, 26: 306-

- 307, 1933; Hungerford, H. B., *Ann. Ent. Soc. Amer.*, 27: 122, 1934.
- LORQUIN, Pierre Joseph Michel. (1797-1873). Boissduval, J. A., *Ann. Soc. Ent. France*, (5) 3: 5-10, 1873; Grinnell, F., *Ent. News*, 15: 202-204, 1904; *A., Pet. Nouv. Ent.*, 4: 284, 1873; Boissduval, J. P. A., *Ann. Soc. Ent. Belg.*, 12: 5-10, 1868-69; Essig, E. O., *P., Hist. of Ent.*, pp. 694-697, 1931.
- LOVELL, John Harney. (1860-1939). *A., Journ. Econ. Ent.*, 32: 733, 1939.
- LÖVENDAL, Emil Adolf. (1839-1901). Hansen, H. J., *B., P., Ent. Tidskr.*, 22: 177-183, 1901.
- LOVETT, Arthur Lester. (1885-1924). Chamberlin, W. J., *P., Ann. Ent. Soc. Amer.*, 17: 355-356, 1924; Chamberlin, W. J., *Ent. News*, 35: 263-264, 1924; Dean, G. A., et al., *Journ. Econ. Ent.*, 17: 421-422, 1924; Osborn, H., *P., Fragments Ent. Hist.*, 1937.
- LÖW, Franz. (1829-1889). Mik, J., *B., P., Wien. Ent. Zeit.*, 9: 49-61, 184, 1890; Douglas, J. W., *Ent. Mo. Mag.*, 26: 25-26, 1890; Rogenhofer, A. F., *B., Verh. zool.-bot. Ges. Wien*, 40: 165-167, 1890; Handlirsch, A., *P., Bot. & Zool. in Oesterr. 1850-1900 Festschr.*, pp. 306-310, 1901; Puton, A., *Rev. d'Ent.*, 8: 276, 1889; Mik, J., *Wien. Ent. Zeit.*, 9: 184, 1890.
- LOWE, Victor Hunt. (1869-1903). Jordan, W. H., *P., Soc. Prom. Agr. Sci. Proc. 25th Ann. Meet.*, p. 20, 1904; Osborn, H., *P., Fragments Ent. Hist.*, p. 70, 1937.
- LOWER, Oswald Bertram. (1863-1925). Carter, H. J., *Proc. Linn. Soc. N. S. Wales*, 51: iii-iv, 1926; Musgrave, A., *B., Bib. Austr. Ent.*, pp. 202-204, 1932.
- LOWRY, Philip Rosemont. (1896-1931). Davis, J. J., *Ann. Ent. Soc. Amer.*, 25: 250, 1932; Osborn, H., *P., Fragments Ent. Hist.*, p. 215, 1937.
- LUBBOCK, John William. (1834-1913). *A., Ent. Mo. Mag.*, 49: 162-163, 1913; *A., Deutsche Ent. Ztschr.*, p. 475, 1913; *A., Nature*, 91: 350-351, 1913; Musgrave, A., *Bib. Austr. Ent.*, p. 204, 1932; *A., B., Schmid & Thesing's Biologen-Kalender*, 1: 363-364, 1914.
- LUCAS, Pierre Hippolyte. (1814-1899). *A., Bull. Mus. Paris*, 5: 321, 1899; *A., Ent. Mo. Mag.*, 35: 276, 1899; Lesne, P., *P., Ann. Soc. Ent. France*, 70: 1-5, 1901; *A., Deutsche Ent. Ztschr.*, 43: 7, 1899; Musgrave, A., *Bib. Austr. Ent.*, pp. 204-205, 1932.
- LUCAS, Thomas Pennington. (1843-1917). Chapman, H. G., *Proc. Linn. Soc. N. S. Wales*, 43: 10, 1918; Gurney, E. H., *B., Proc. Roy. Soc. Queensl.*, 30: 2, 1918; Musgrave, A., *B., Bib. Austr. Ent.*, p. 205, 1932.
- LUCAS, William John. (1858-1932). Killington, F. J., *B., P., Entomologist*, 65: 25-27, 1932; Blair, K. G., et al., *Ent. Mo. Mag.*, 68: 42, 1932; Walker, J. J., et al., *Ent. Mo. Mag.*, 68: 69-70, 1932; Blair, K. G., *P., Proc. Soc. Lond. Ent. & N. H. Soc.*, p. 35, 1931-32.
- LUCASSEN, Frans Titus Valck. ( -1939). *A., Ent. Berichten*, 10: 181, 1939; *A., Arb. morph. taxon. Ent. Berlin-Dahlem*, 6: 349, 1939; Uyttenboogaart, D. L., *B., P., Tijd. Ent.*, 83: 1-2, 1940.
- LÜDDEMANN, Andreas. (1858-1938). *A., Arb. morph. taxon. Ent. Berlin-Dahlem*, 5: 296, 1938.
- LUDLOW, Clara Southmayd. (1852-1924). *A., Journ. Wash. Acad. Sci.*, 14: 418, 1924; Calvert, P. P., *Ent. News*, 35: 379-380, 1924.
- LUEDERWALDT, Hermann. (1865-1934). *A., P., Rev. Ent. (Rio d. J.)*, 4: 413-416, 1934; *A., Arb. morph. taxon. Ent. Berlin-Dahlem*, 1: 309, 1934.
- LUGGER, Otto. (1844-1901). *A., Ann. Rpt. Ent. Soc. Ont.*, 32: 125, 1901; Howard, L. O., *Science*, n. s., 13: 980-981, 1901; Howard, L. O., *Ent. News*, 12: 222-224, 1901; Baker, C. F., *Ent. News*, 13: 98, 1902; Wade, J. S., *Proc. Ent. Soc. Wash.*, 38: 124, 1936; Howard, L. O., *P., Hist. Applied Ent.*, 1930; Osborn, H., *P., Fragments Ent. Hist.*, 1937.
- LUIGIONI, Paolo. (1873-1937). *A., Boll. Soc. Ent. Ital.*, 69: 49, 1937; *A., Arb. morph. taxon. Ent. Berlin-Dahlem*, 4: 241, 1937; Carruti, M., *B., P., Mem. Soc. Ent. Ital.*, 17: 253-256, 1939; *A., Koleopt. Rundschau*, 23: 244, 1937.
- LUND, Peter Wilhelm. (1801-1880). Henriksen, K. L., *P., Ent. Meddel.*, 15: 211-213, 1926; Reinhardt, Overs. Danske Vidensk. Selsk. Forh., pp. 147-210, 1880-81; *A., Natur*, 6: 462, 1880; *A., Ibis*, (4) 4: 483-484, 1880; *A., Leopoldina*, 16: 143, 1880.

- LUNDSTROM, Carl August. (1844-1914). *Palmen*, J. A., *P.*, Medd. Soc. Fauna et Flora Fenn., 41: 106-107, 1915; *Frey*, R., *B.*, *P.*, Luonnon Ystävä, 1: 12-15, 1915; *A.*, *B.*, Acta Soc. Fauna et Flora Fenn., 44: 24-25, 1916; *A.*, Wien. Ent. Zeit., 34: 68, 1915.
- LUTSCHNIK (LUTSNIK), Viktora Nikolaevicha. (1892-1936). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 151, 1936; *Plavilstshikov*, N. N., *B.*, *P.*, Rev. Ent. URSS, 27: 267-280, 1938; *Plavilstshikov*, N. N., Folio Zool. & Hydrobiol. (Riga), 9: 143, 1936.
- LUTZ, Adolfo. (1855-1940). *Porter*, C. E., Rev. Chilena Hist. Nat., 44: 396, 1940; *Birabén*, M., *B.*, *P.*, Rev. Mus. La Plata, Secc. Ofic., pp. 149-157, 1941; *Veiva*, A., *B.*, *P.*, Mem. Inst. Oswaldo Cruz, 36: i-xxiii, 1941; *Howard*, L. O., *P.*, Hist. Applied Ent., 1930.
- LUTZ, Frank Eugene. (1879-1943). *A.*, *P.*, N. Y. Tribune, Nov. 28, Sect. I, p. 69; *A.*, Journ. Econ. Ent., 36: 949, 1943; *Osborn*, H., *P.*, Fragments Ent. Hist., p. 270, 1937; *Schwarz*, H. F., *P.*, Ent. News, 55: 29-32, 1944; *Emerson*, A. E., Science, 99: 233-234, 1944; *Riley*, N. D., Entomologist, 77: 48, 1944; *Gertsch*, W. J., Ann. Ent. Soc. Amer., 37: 133-135, 1944; *Weiss*, H. B., et al., *B.*, *P.*, Journ. N. Y. Ent. Soc., 52: 63-73, 1944; *A.*, Can. Ent., 76: 69, 1944.
- LYLE, George Trevor. (1873-1930). *Lucas*, W. J., Entomologist, 63: 239-240, 1930; *Turner*, H. J., Ent. Record, 42: 160, 1930; *Jordan*, K., Proc. Ent. Soc. Lond., 5: 131, 1931.
- LYMAN, Henry Herbert. (1854-1914). *A.*, *P.*, Can. Ent., 32: 1-2, 1900; *Bethune*, C. J. S., *P.*, Ann. Rpt. Ent. Soc. Ont., 30: 123, 1899; *Bethune*, C. J. S., Ann. Ent. Soc. Amer., 8: 100-101, 1915; *Bethune*, C. J. S., *B.*, *P.*, Ann. Rpt. Ent. Soc. Ont., 45: 118-121, 1914; *Bethune*, C. J. S., *B.*, *P.*, Can. Ent., 46: 221-226, 1914; *Skinner*, H., Ent. News, 25: 335-336, 1914; *Hewitt*, C. G., *P.*, Ann. Rpt. Ent. Soc. Ont., 45: 28-29, 1914; *Osborn*, H., Fragments Ent. Hist., p. 208-209, 1937.
- LYNCH-ARRIBALZAGA, Felix. ( -1894). *A.*, Ent. News, 6: 32, 1895; *Holmberg*, E. L., An. Soc. Cient. Arg., 37: 161-163, 1894; *Schaffuss*, C., Ent. Wochenbl., 24: 60, 1907; *Horn*, W., Deutsche Ent. Ztschr., p. 231, 1907; *Porter*, C. E., *P.*, Rev. Chilena Hist. Nat., 32: 409-412, 1928.
- LYON, Marcus Ward, Jr. (1875-1942). *Just*, T., *B.*, *P.*, Amer. Midland Nat., 27 (3): ii-iv, 1942.
- LYONET, Pierre. (1707-1789). *Locy*, W. A., Biology and its makers, 3rd ed., pp. 89-95, 1915; *Miall*, L. C., Early naturalists, their lives and works, pp. 291-293, 1912; *Swainson*, W., Bib. of Zool., pp. 256-257, 1840; *Herklots*, J. A., Nederl. Ent. Ver., 1: 38-40, 1854; *Snellen van Vollenhoven*, S. C., *P.*, Album der Natuur, 1: 1-14, 1880; *Locy*, W. A., *P.*, Story of Biol., pp. 257-262, 1925; *Nordenskiöld*, Erik, Hist. of Biol., p. 233, 1935; *Duméril*, A. M. C., Consid. Gén. sur la Classe des Ins., p. 252, 1823; *Howard*, L. O., *P.*, Hist. Applied Ent., 1930.
- MAAS, Franz. (1850-1929). *Rapp*, O., *P.*, Ent. Blätter, 26: 1-4, 1930.
- MAAS, Otto. ( -1916). *Soldanski*, H., Deutsche Ent. Ztschr., p. 228, 1916.
- MAASEN, Peter. (1810-1890). *A.*, Ent. News, 1: 146, 1890; "W. F. K.", Ent. Mo. Mag., 26: 273, 1890; "F.", Krancher's Ent. Jahrb., p. 197, 1892.
- MABILLE, Paul. (1835-1923). *A.*, Ent. News, 34: 256, 1923; *Rabaud*, E., Bull. Soc. Ent. France, p. 102, 1923; *Musgrave*, A., *B.*, Bib. Austr. Ent., pp. 206-207, 1932.
- MACGILLIVRAY, Alexander Dyar. (1868-1924). *A.*, *P.*, Ann. Ent. Soc. Amer., 17: 233, 1924; *Riley*, W. A., Ent. News, 35: 224-228, 1924; *Comstock*, J. H., Science, n. s., 59: 503, 1924; *Musgrave*, A., Bib. Austr. Ent., pp. 208-209, 1932; *Osborn*, H., *P.*, Fragments Ent. Hist., pp. 207-208, 1937.
- MACHIN, William. (1822-1894). *Barrett*, C. G., Ent. Mo. Mag., 30: 214, 1894; *A.*, Entomologist, 27: 300, 1894; *Tutt*, J. W., Ent. Record, 5: 209-210, 1894.
- MACKWOOD, F. M., (1843-1931). *Fletcher*, T. B., Entomologist, 64: 288, 1931; *Eltringham*, H., Proc. Ent. Soc. Lond., 6: 107, 1932.
- MACLEAN, Allan. (1795-1869). *Newman*, E., Entomologist, 4: 357-358, 1869.
- MACLEAY, Alexander. (1767-1848). *Walkom*, A. B., Proc. Linn. Soc. N. S. Wales, 67: v-vii, 1942; *A.*, Proc. Linn. Soc. Lond., 2: 45, 1849.

- MACLEAY, William John. (1820-1891). Haswell, W. A., Proc. Linn. Soc. N. S. Wales, (2) 6: 707-716, 1891; Fletcher, J. J., Linn. Soc. N. S. Wales Macleay Memorial Volume, pp. xii-li, 1893; Musgrave, A., Austr. Zool., 6: 199, 1930; Musgrave, A., Bib. Austr. Ent., pp. 212-213, 1932; Walkom, A. B., Proc. Linn. N. S. Wales, 67: ix-xv, 1942.
- MACLEAY, William Sharp. (1792-1865). Newman, E., Zoologist, 23: 9584, 1865; Pascoe, F. P., Proc. Ent. Soc. Lonr., (3) 2: 139, 1866; Newman, E., Ent., 2: 211, 1865; A., B., Proc. Linn. Soc. Lond., pp. c-ciii, 1864-65; Fletcher, J. J., Linn. Soc. N. S. Wales Macleay Memorial Volume, pp. ix-xii, 1893; Musgrave, A., Bib. Austr. Ent., pp. 213-214, 1932; Fletcher, J. J., Proc. Linn. Soc. N. S. Wales, 45: 584, 591-629, 1920; l. c., 54: 185, 1929; Walkom, A. B., Proc. Linn. Soc. N. S. Wales, 67: vii-ix, 1942.
- MACLOSKIE, George. (1834-1920). A., B., Ent. News, 31: 89-90, 1920; Osborn, H., Fragments Ent. Hist., p. 227, 1937.
- MACLURE, William. (1763-1840). Morton, S. G., B., P., Mem. Acad. Nat. Sci. Phila. 1841. (Published by direction of the Acad.)
- MACQUART, Pierre Justin Marie. (1778-1855). Sichel, J., Ann. Soc. Ent. France, (3) 3, (Bull.): cxiv, 1855.
- MAGRETTI, Paolo. (1854-1913). A., Ent. News, 24: 432, 1913; Senna, A., B., Bull. Soc. Ent. Ital., 45: 245-247, 1913; Gestro, R., Ann. Soc. Ent. France, 82: 792, 1913; A., Miscellanea Ent., 21 (7): 48-49, 1913.
- MAILLE, Arsène. (1784-1839). Serville, A., Ann. Soc. Ent. France, 8: 603-606, 1839.
- MAINDRON, Maurice. (1857-1911). Desbordes, H., B., P., Ann. Soc. Ent. France, 80: 503-510, 1912; A., Deutsche Ent. Ztschr., p. 732, 1911; Janet, A., Bull. Soc. Ent. France, pp. 277-279, 1911; Semenov-Tian-Shanskij, A., Rev. Russe Ent., 12: 637-638, 1912.
- MÄKLIN, Friedrich Wilhelm. (1821-1883). Sandahl, O. T., B., Ent. Tidskr., 4: 6-8, 51-52, 1883; Bergroth, E., Wien. Ent. Zeit., 2: 48, 1883; Kraatz, G., Deutsche Ent. Ztschr., 27: 396-397, 1883.
- MALINKOWSKI, August Ludwig von. (1809-1862). A., Correspbl. Ver. Naturk. Pressburg, 2: 109-111, 1863.
- MALLY, Frederick William. (1868-1939). Sasser, E. R., Journ. Econ. Ent., 32: 601, 1939; Sachtleben, H., Arb. phys. angew. Ent. Berlin-Dahlem, 6: 379, 1939; A., Ann. Ent. Soc. Amer., 34: 262, 1941; Osborn, H., Fragments Ent. Hist., p. 235, 1937.
- MALM, August Wilhelm. (1821-1882). Spangberg, J., Ent. Tidskr., 3: 157-159, 161-162, 1882; A., Zool. Anzeiger, 5: 316, 1882.
- MALOCH, Johann. (1825-1911). Uzel, H., P., Beitr. Insekt.-Fauna Böhmens, 8: 1-18, 1913.
- MALPIGHI, Marcello. (1628-1694). Locy, W. A., B., Biology and its makers, 3rd ed., pp. 58-67, 202-205, 1915; Miall, L. C., Early naturalists, their lives and work, pp. 145-166, 1912; Locy, W. A., P., Story of Biol., pp. 229-240, 1925; Nordenskiöld, Erik, P., Hist. of Biol., pp. 159-164, 1935; Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., p. 244, 1823.
- MANN, Benjamin Pickman. (1848-1926). A., Ent. News, 37: 192, 1926; A., P., Psyche, 33: 172, 1926; A., Wash. Post, Mar. 24, 1926; A., Science, 63: 353, 1926; Wade, J. S., Proc. Ent. Soc. Wash., 38: 124-125, 1936; Osborn, H., P., Fragments Ent. Hist., p. 171, 1937.
- MANN, Joseph Johann. (1804-1889). Rogenhofer, A., P., Wien. Ent. Zeit., 8: 241-244, 1889; Rogenhofer, A., Ann. Hofmus. Wien, 4, (Notizen): 79-81, 1889; A., Sitzb. naturw. Ges. Isis Dresden, Jan.-June, pp. 18-19, 1889.
- MANNERHEIM, Carl Gustav von. (1804-1854). Dow, R. P., Bull. Bklyn. Ent. Soc., 9: 98-99, 1914; Newman, E., Trans. Ent. Soc. Lond., n. s., 3, (Proc.): 54, 1854; Swainson, W., B., Bib. of Zool., p. 258, 1840; Sahlberg, J., Finska Tidskr., 87: 76-100, 1919; Nordman, A., von, Acta Soc. Fenn., Suppl., pp. 1-24, 1855; Musgrave, A., Bib. Austr. Ent., p. 216, 1932; Motschulsky, V. I., Etudes Entomologiques, 4: 5-7, 1855; Marseul, S. A., de, L'Abeille, 24: 170-173, 1886-87; Essig, E. O., B., P., Hist. of Ent., pp. 698-700, 1931.
- MANSON, Patrick. (1844-1922). Calvert, P. P., Ent. News, 33: 159, 1922; "W. M.

- K., U. S. Naval Med. Bull., 17: 269-272, 1922; Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- MARALDI, Giacomo Filippi. (1665-1729). *A.*, L'Apiculture, 11: 172-174, 1866-67.
- MARCGRAVE, George. (1610-1644). Locy, W. A., Story of Biol., pp. 303-305, 1925.
- MÄRKEL, Johann Christian Friedrich. (1790-1860). Kiesenwetter, H. von, Berlin. Ent. Ztschr., 4: 326-328, 1860.
- MARKEL, August. (1837-1897). Dietz, O., Ent. News, 8: 184, 1897.
- MARNO, Ernst. ( -1883). *A.*, Wien. Ent. Zeit., 2: 288, 1883.
- MARQUET, Charles. (1820-1900). Trutat, E., *B.*, Bull. Soc. Hist. Nat. Toulouse, 33: 182-187, 1900.
- MARSCHALL, August Friedrich. (1804-1887). Dimmock, G., Psyche, 5: 156, 1889.
- MARSEUL, Sylvain Augustin de. (1812-1890). Perraudière, R. de la, *B.*, *P.*, Ann. Soc. Ent. France, (6) 10: 421-428, 1890; "F.", Krancher's Ent. Jahrb., p. 195, 1892; *A.*, Ent. Mo. Mag., 26: 163-164, 1890.
- MARSH, Harold Oscar. (1885-1918). Craighead, F. C., *B.*, Journ. Econ. Ent., 11: 438-439, 1918; Fullaway, D. T., et al., Proc. Haw. Ent. Soc., 4: 235-236, 1920.
- MARSHALL, William. (1845-1907). Schaufuss, C., Ent. Wochenbl., 24: 174-175, 1907; Horn, W., Deutsche Ent. Ztschr., p. 591, 1907.
- MARSHAM, Thomas. ( -1819). Fletcher, J. J., Proc. Linn. Soc. N. S. Wales, 45: 570-571, 574, 1920.
- MARSTON, Leon Chester, Jr. (1905-1937). Mickel, C. E., Ann. Ent. Soc. Amer., 31: 121, 1938.
- MARTENS, Georg Matthias. (1788-1872). *A.*, Leopoldina, 7: 91, 1872; *A.*, Zool. Garten, 13: 96, 1872; Martens, E. von, Jahresh. Ver. Vaterl. Naturk. Württemberg, 29: 66-68, 1873.
- MARTIN, Charles Jacob. (1835-1929). Engelhart, G. P., Bull. Bklyn. Ent. Soc., 25: 39, 1930.
- MARTIN, Henry Newell. (1848-1896). *A.*, Leopoldina, 33: 48, 1897.
- MARTIN, Paul Ferdinand. (1884-1935). Hungerford, H. B., Ann. Ent. Soc. Amer., 29: 185, 1936.
- MARTIN, René. (1846-1925). Calvert, P. P., *P.*, Ent. News, 38: 197-205, 1927; Berland, L., *B.*, Ann. Soc. Ent. France, 96: 27-30, 1927.
- MARTINDALE, Isaac C., (1842-1893). *A.*, *P.*, Ent. News, 4: 37-38, 1893.
- MARTINI, Frederick Henry Guillaume. (1729-1778). Swainson, W., Bib. of Zool., pp. 261-262, 1840.
- MARTINI, Wilhelm. (1846-1913). Petry, A., *B.*, Deutsche Ent. Ztschr. Iris, 27: 142-144, 1913; *A.*, *B.*, Jahresh. Ver. Schles. Insektenk. Breslau, 7: xxi-xxiii, 1914.
- MARTYN, Thomas ( - ). Strecker, H., *B.*, Butterflies and moths of N. A., p. 253, 1878; Weiss, H. B., Amer. Collector, 3: 57-62, 1926.
- MARTYNOV, Andreas Vassilievitch. (1870-1938). Carpenter, F. M., *P.*, Psyche, 45: 80-83, 1938; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 5: 187, 1938.
- MARX, George. (1838-1895). *A.*, Ent. News, 6: 64, 1895; Riley, C. V., et al., *B.*, *P.*, Proc. Ent. Soc. Wash., 3: 195-201, 1896; Wade, J. S., Proc. Ent. Soc. Wash., 38: 126, 1936; Essig, E. O., *P.*, Hist. of Ent., pp. 700-702, 1931.
- MASKELL, William Miles. (1840-1898). *A.*, Entomologist, 31: 176, 1898; *A.*, Trans. N. Z. Inst., 31: 708-709, 1898; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 218-219, 1932; Minutes Wellington Phil. Soc. June 29, 1898; *A.*, Ent. Mo. Mag., 34: 139, 1898; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Essig, E. O., *P.*, Hist. of Ent., pp. 702-704, 1931.
- MASON, Frank R., (1882-1927). Nicolay, A. S., et al., Ent. News, 39: 102-104, 1928.
- MASSALONGO, Abramo Bartolommeo. (1824-1860). Cornalia, E., *B.*, Atti Soc. Ital. Sci. Nat., 2: 188-206, 1860; Krempelhuber, A. von, *B.*, Verh. zool.-bot. Ges. Wien, 18: 35-94, 1868; Visiani, R. de, *B.*, Atti Istit. Veneto, (3) 6: 241-305, 1860-61.
- MASTERS, George. (1837-1912). *A.*, Ent. News, 23: 436, 1912; *A.*, Ent. Mo. Mag., 48: 219-220, 1912; Lea, A. M., *P.*, Vict. Nat., 45: 165-167, 1928; Fletcher, J. J., Proc. Linn. Soc. N. S. Wales, 54: 214, 217-218, 220-230, 233, 235, 239, 1929; Froggatt, W. W., Proc. Linn. Soc. N. S. Wales, 38: 2-5, 1913; Musgrave, A.,



- Bib. Austr. Ent., p. 219, 1932; Semenov-Tian-Shanskij, A., Rev. Russe Ent., 12: 639, 1912.
- MATAUSCH, Ignaz. (1859-1915). *A.*, Ent. News, 27: 384, 1916; Miner, R. W., *B.*, Journ. N. Y. Ent. Soc., 24: 155-157, 1916; Soldanski, H., Deutsche Ent. Ztschr., p. 606, 1916.
- MATHEW, Gervase Frederick. (1842-1928). Walker, J. J., Ent. Mo. Mag., 64: 92-93, 1928; *A.*, Ent. News, 39: 296, 1928; Walker, J. J., Proc. Linn. Soc. Lond., p. 125, 1927-28; Collins, J. E., Proc. Ent. Soc. Lond., 3: 103, 1929; Turner, H. J., Ent. Record, 40: 48, 1928; Riley, N. D., Entomologist, 61: 119-120, 1928; Musgrave, A., Bib. Austr. Ent., pp. 219-220, 1932.
- MATTEUCCI, Carlo. (1811-1868). *A.*, Amer. Journ. Sci., (2) 46: 285, 1868; Rive, A. de la, Arch. Sci. Phys. Genève, n. s., 32: 212-218, 1868; Rive, A. de la, Ztschr. Österr. Ges. für Meterol., 3: 593-600, 1868.
- MATTHEWS, Andrew. (1815-1897). *A.*, Ent. News, 8: 256, 1897; *A.*, Entomologist, 30: 276, 1897; "W. W. F.", Ent. Mo. Mag., 33: 258-260, 1897; Trimmen, R., Trans. Ent. Soc. Lond., (Proc.): lxxiii, 1897; Musgrave, A., Bib. Austr. Ent., p. 220, 1932.
- MATTHEWS, H. ( - ). Matthews, A., Ent. Mo. Mag., 14: 38-39, 1877.
- MATTHIOLUS, (MATTIOLI), Pierandrea. (1501-1577). Locy, W. A., *P.*, Story of Biol., pp. 146-148, 1925.
- MATUSCHKA, Victor von. (1825-1909). Dittrich, R., Jahresh. Ver. Schles. Insektenk. Breslau, 3: xxiii-xxv, 1910.
- MAWSON, George. ( - 1884). Dimmock, G., Psyche, 4: 266, 1885.
- MAYER, Karel. (1912-1939). Teyrovsky, V., *P.*, Folio Zool. & Hydrobiol. (Riga), 10: 369-370, 1940.
- MAYR, Gustav. (1830-1908). *A.*, Ent. News, 19: 396, 1908; Dalla-Torre, K. W. von, *B.*, *P.*, Wien. Ent. Zeit., 27: 255-271, 1908, 28: 344, 1909; Kohl, F. F., *B.*, *P.*, Verh. zool.-bot. Ges. Wien, 58: 512-528, 1908; Forel, A., Mitt. Schweiz. Ent. Ges., 11: 361-364, 1909; A., Marcellia, 7: 122-129, 1908; Musgrave, A., Bib. Austr. Ent., pp. 220-221, 1932; Semenov-Tian-Shanskij, A., Rev. Russe Ent., 8: 349-350, 1908.
- MAZARAKI, Viktor Viktorovich. (1857-1912). Jacobson, G. G., *B.*, *P.*, Rev. Russe Ent., 12: xxix-xxxiii, 1912.
- MCCOLLOCH, James Walker. (1889-1929). Dean, G. A., Journ. Econ. Ent., 22: 990-991, 1929; Dean, G. A., Kansas Industrialist, 56 (10): 3, 1929; *A.*, Ent. News, 41: 64, 1930; Hayes, W. P., Ann. Ent. Soc. Amer., 23: 195-196, 1930; Parker, R. L., et al., *B.*, *P.*, Journ. Kans. Ent. Soc., 3: 51-52, 1930, 6: 137-142, 1933; Osborn, H., Fragments Ent. Hist., p. 214, 1937.
- MCCONNELL, Wilbur Ross. (1881-1920). *A.*, Ent. News, 31: 239, 1920; Walton, W. R., Journ. Econ. Ent., 13: 371-373, 1920; Osborn, H., Fragments Ent. Hist., p. 215, 1937.
- MCCOOK, Henry Christopher. (1837-1911). Calvert, P. P., *P.*, Ent. News, 22: 433-438, 1911; Hunter, W. H., *P.*, Ohio Archeol. & Hist. Pub., 6: 109, 1898; Skinner, H., et al., *P.*, Ann. Ent. Soc. Amer., 5: 73, 1912; Osborn, H., *P.*, Fragments Ent. Hist., p. 205, 1937.
- MCCOY, Frederick. (1823-1899). *A.*, Victorian Nat., 16: 19, 92, 1899; "H. B. W.", Nature, 60: 83, 1899; Musgrave, A., Bib. Austr. Ent., p. 208, 1932.
- MCCULLOUGH, Allan Riverstone. (1885-1925). Anderson, C., et al., *B.*, *P.*, Rec. Austr. Mus., 15: 141-148, 1926; Musgrave, A., Bib. Austr. Ent., p. 208, 1932.
- MCGLASHAN, Charles Fayette. (1847-1931). Essig, E. O., Pan-Pacific Ent. 7: 97-99, 1931; Essig, E. O., Hist. of Ent., pp. 704-705, 1931.
- MCGREGOR, Richard Crittenden. (1871-1936). Alexander, C. P., *P.*, Philipp. Journ. Sci., 63: 359-361, 1937.
- MCLROY, William Denmark, Jr. (1906-1932). Hungerford, H. B., Ann. Ent. Soc. Amer., 27: 122, 1934.
- McKELLAR, Hugh. (1849-1929). Criddle, N., Can. Ent., 61: 288, 1929.
- McLACHLAN, Robert. (1837-1904). Eaton, A. E., et al., Ent. Mo. Mag., 40: 145-148, 1904; *A.*, Ent. Record, 16: 217, 1904; Lucas, W. J., Entomologist, 37: 195-196, 1904; Autobiography, Trans. Ent. Soc. Lond., (Proc.): lxxxi-lxxxiii, 1886;



- "K. J. M.", *Ann. Scot. Nat. Hist.*, 52: 201-203, 1904; Calvert, P. P., *P., Ent. News*, 15: 226-228, 1904; Poulton, E. B., *Trans. Ent. Soc. Lond.*, (Proc.): xxxviii, xcvi-xcvi, 1904; "W. F. K.", *Nature*, 70: 106, 1904; *A., Cent. Hist. Ent. Soc. Lond.*, pp. 141-142, 1933; Musgrave, A., *Bib. Austr. Ent.*, pp. 210-211, 1932; Kusnezov, N. J., *B., Rev. Russe Ent.*, 4: 253-254, 1904; Essig, E. O., *B., P., Hist. of Ent.*, pp. 707-708, 1931.
- McLAINE, Leonard Septimus. (1887-1943). Keenan, W. N., et al., *B., P., Can. Ent.*, 76: 1-4, 1944; Fernald, H. T., *P., Journ. Econ. Ent.*, 36: 946-947, 1943; Osborn, H., *P., Fragments Ent. Hist.*, p. 270, 1937.
- McLEMORE, John Anderson. ( - ). Cockerham, K. L., *Journ. Econ. Ent.*, 19: 418-419, 1926.
- McMILLAN, H. Ellis. ( -1934). *A., Ann. Rpt. Ent. Soc. Ont.*, 66: 5, 1936; Hungerford, H. B., *Ann. Ent. Soc. Amer.*, 29: 185, 1936.
- MEADE, Richard Henry. (1814-1899). *A., Ent. News*, 11: 412, 1900; McLachan, R., *Ent. Mo. Mag.*, 36: 46-47, 1900; Mik, J., *Wien. Ent. Zeit.*, 19: 88, 1900; Verrall, G. H., *Trans. Ent. Soc. Lond.*, (Proc.), pp. xxxvii-xxxix, 1899.
- MEADE-WALDO, Geoffrey. (1884-1916). *A., Entomologist*, 49: 95-96, 1916; *A., Ent. Mo. Mag.*, 52: 117-118, 1916; "G. W.", *Ent. Record*, 28: 96, 1916; *A., Ent. News*, 27: 382, 1916; Hewitt, C. G., *Can. Ent.*, 48: 196, 1916; Musgrave, A., *Bib. Austr. Ent.*, p. 221, 1932; Soldanski, H., *Deutsche Ent. Ztschr.*, pp. 364-365, 1916.
- MECKEL, Johann Friedrich. (1781-1833). Nordenskiöld, Erik, *Hist. of Biol.*, pp. 355-359, 1935; Locy, W. A., *P., Story of Biol.*, pp. 354-356, 1925.
- MEEHAN, Thomas. (1826-1901). Howard, L. O., *P., Hist. Applied Ent.*, 1930.
- MEES, Adolf. ( -1915). Gauckler, H., *Ent. Rundschau*, 33: 5, 1916; Soldanski, H., *Deutsche Ent. Ztschr.*, p. 227, 1916.
- MEGENBERG, Conrad (Cunrat). (ca. 1309-1374). Locy, W. A., *Story of Biol.*, pp. 109-118, 1925.
- MEGERLE VON MÜHLFELD, Johann Carl. (1765-1832). Gisl, J., *Faunus*, 1: 55, 1832.
- MEHRING, Johannes. ( -1878). *A., Vereinsbl. Westf.-Rhein. Ver. Bienen u. Seidenzicht*, 30: 35, 1879.
- MEIGEN, Johann Wilhelm. (1764-1845). Förster, J. A., *Stett. Ent. Zeit.*, 7: 66-74, 130-141, 1846; Macquart, J., *Ann. Soc. Ent. France*, (2) 5: 323-334, 1847; Buquet, L., *Ann. Soc. Ent. France*, (2) 5, (Proc.): lxxvi-lxxvii, 1847; Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, p. 265, 1823; Howard, L. O., *P., Hist. Applied Ent.*, 1930.
- MEINERT, Frederik Vilhelm August. (1833-1903). Klöcker, A., *B., P., Ent. Meddel.*, (2) 2: 65-71, 1903; Henriksen, K. L., *B., P., Ent. Meddel.*, 15: 253-262, 1927; Semenov, A., *Rev. Russe Ent.*, 3: 344, 1903; Howard, L. O., *P., Hist. of Applied Ent.*, 1930.
- MEISNER, Karl Friedrich. (1765-1825). Brunner, S., *Ann. Allg. Schweiz. Ges. Naturw.*, 2: 241-253, 1825.
- MELDOLA, Raphael. (1849-1915). *A., Ent. News*, 27: 46-47, 1916; *A., Ent. Mo. Mag.*, 52: 21, 1916; Distant, W. L., *Entomologist*, 49: 23-24, 1916.
- MELICHAR, Leopold. (1856-1924). *A., Ent. News*, 36: 224, 1925; China, W. E., *Ent. Mo. Mag.*, 60: 263, 1924; China, W. E., *Entomologist*, 57: 240, 1924; Navrátil, M., *B., Wien. Ent. Zeit.*, 36: 31-36, 1917; *A., Wien. Ent. Zeit.*, 41: 186, 1924; Musgrave, A., *Bib. Austr. Ent.*, pp. 221-222, 1932; Rambousek, F. J., *B., P., Acta Soc. Ent. Cechslav.*, 22: 1-3, 1925.
- MELLY, André. (1802-1851). Schaum, H., *Stett. Ent. Zeit.*, 13: 67-71, 1852; Guex, M., *Ann. Soc. Ent. France* (2) 9, (Bull.): xxxv, 1851.
- MELSHEIMER, Friedrich Ernst. (1782-1873). *A., Can. Ent.*, 6: 39-40, 1874; *A., Nat. Canadien*, 6: 19-20, 1874; Leconte, J. L., *Proc. Acad. Nat. Sci. Phila.*, 25: 257-258, 1873; Mann, B. P., *Proc. Ent. Soc. Wash.*, 1: 60-61, 1886; Morris, J. G., *Amer. Journ. Sci.*, (2) 1: 19, 1846; Smith, J. B., *Pop. Sci. Mo.*, 76: 469, 1910; Hagen, H. A., *Can. Ent.*, 16: 191-197, 1884.
- MELSHEIMER, Friedrich Valentin. (1749-1814). Dow, R. P., *Bull. Bklyn. Ent. Soc.*, 8: 52, 114-115, 1913; Hagen, H. A., *Can. Ent.*, 16: 191-197, 1884; Knoch, A., *W., Neue Beitr. Insectenk.*, p. 18, 1801; Morris, J. G., *Amer. Journ. Sci.*, (2) 1:

- 18-19, 1846; Prowell, G. R., *Proc. & Coll. Hist. Soc. York Co., Penna.*, (paper read Apr. 8, 1897), 1 (2): 17-26, 1903; Schwarz, E. A., *Proc. Ent. Soc. Wash.*, 3: 134-138, 1894; Osborn, H., *P., Fragments of Ent. Hist.*, 1937.
- MELSHIMER, John F. (1780?-1829). Fox, W. J., *Ent. News*, 12: 110-113, 138-141, 173-177, 203-205, 233-236, 281-283, 314-316, 1901; 13: 9-11, 38-40, 1902.
- MELVILL, James Cosmo. (1845-1929). Riley, N. D., *Entomologist*, 63: 96, 1930.
- MELZER, Julius. (1878-1934). Borgmeier, T., *P., Rev. Ent. (Rio de J.)*, 5: 89-90, 1935; Linsley, E. G., *Pan-Pacific Ent.*, 11: 81, 1935; *A., Arb. morph. taxon. Ent. Berlin-Dahlem*, 2: 63, 1935.
- MÉNÉTRIÈS, Edouard. (1802-1861). *A., B., P., Horae Soc. Ent. Ross.*, 2: 1-7, 1863; Marseul, S. A., *B., L'Abeille*, 22: 137-139, 1884; Essig, E. O., *P., Hist. of Ent.*, pp. 706-707, 1931.
- MENGE, Franz Anton. (1808-1880). Ohlert, B., *Schrift. Nat. Ges. Danzig*, n. s., 5: xl-xlviii, 1881; *A., Zool. Anzeiger*, 3: 120, 1880.
- MENGEL, Levi Walter Scott. (1868-1941). *A., P., "In Memoriam"*, Reading (Pa.) Teachers' Assoc., pp. 1-23, 1941.
- MENSIK, Emanuel. (1851-1913). Dittrich, R., *Jahresh. Ver. Schles. Insektenk. Breslau*, 7: xxiv-xxv, 1914.
- MENZEL, August. (1810-1878). *A., B., Mitt. Schweiz. Ent. Ges.*, 5: 492-494, 1879.
- MERA, Arthur William. (1849-1930). Turner, H. J., *Ent. Record*, 42: 143-144, 1930; *A., Entomologist*, 63: 264, 1930.
- MERCET, Ricardo Garcia. (1860-1932). Dusmet, J. M., *Bol. Soc. Ent. Espana*, 16: 112-113, 1933; *A., Boll. Soc. Ent. Ital.*, 65: 117, 1933.
- MERCK, Paul. (1793-1849). Pierret, A., *Ann. Soc. Ent. France*, (2) 7, (Bull.): lxxviii-lxix, 1849; Mulsant, E., *Ann. Soc. Linn. Lyon*, 2: 238, 1850.
- MEREDITH, Louisa Anne. (1812-1895). Musgrave, A., *Austr. Zool.*, 6: 197, 1930; Musgrave, A., *Bib. Austr. Ent.*, p. 222, 1932; Fletcher, J. J., *Proc. Linn. Soc. N. S. Wales*, 54: 190, 1929; Swann, M., *Journ. & Proc. Roy. Austr. Hist. Soc.*, 15: 1-29, 1929.
- MERIAN, Maria Sybilla. (1647-1717). Swainson, W., *B., Bib. of Zool.*, pp. 272-273, 1840; Strecker, H., *B., Butterflies and moths of N. A.*, pp. 254-255, 1878; *A., P., Jardine's Nat. Library*, 30: 17-46, 1848; Hagen, H. A., *B., Bib. Ent.*, 1: 534-537, 1862; 2: 387, 1863; Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, p. 246, 1823; Howard, L. O., *P., Hist. of Applied Ent.*, 1930.
- MERRIAM, Clinton Hart. (1856-1942). *A., Ent. News*, 53: 150, 1942; *A., Science*, 95: 318, 1942; Daubenmire, R. F., *B., Quart. Rev. Biol.*, 13: 327-332, 1938.
- MERRICK, Franklin A. (1844-1912). Engel, H., *Ent. News*, 24: 144, 1913; *A., Can. Ent.*, 45: 170, 1913.
- MERRICK, Harry Duncan. (1869-1907). *A., Ent. News*, 18: 320, 1907.
- MERRIFIELD, Frederick. (1831-1924). *A., Ent. News*, 35: 304, 1924; *A., Ent. Mo. Mag.*, 60: 156-157, 1924; *A., Ent. Record*, 36: 93-94, 1924; Poulton, E. B., *Entomologist*, 57: 239-240, 1924; Green, E. E., *Trans. Ent. Soc. Lond.*, (Proc.): clxi-clxii, 1924.
- MERRIN, Joseph. (1820-1904). *A., Ent. Mo. Mag.*, 40: 112, 1904; *A., Ent. Record*, 16: 192, 1904; *A., Leopoldina*, 41: 39, 1905.
- MESKE, Otto von. (1837-1890). *A., Ent. Amer.*, 6: 180, 1890.
- METCHNIKOFF (MECHNIKOV), Ilya Ilich. (1845-1916). *A., Ent. News*, 27: 383-384, 1916; Semenov-Tian-Shanski, A., *Rev. Russe Ent.*, 16: 399-404, 1916; Soldanski, H., *Deutsche Ent. Ztschr.*, p. 365, 1916.
- METELKA, Ferencz. (1814-1885). Vängel, J., *P., Rovartani Lapok*, 2: 129-133, 1885.
- MEUNIER, Fernand. ( -1926). *A., Ent. News*, 37: 312, 1926; *A., Bull. Soc. Ent. France*, p. 65, 1926.
- MEVES, Julius Seelhorst. (1844-1926). Calvert, P. P., *Ent. News*, 38: 261, 1927; Aurivillius, M., *B., P., Ent. Tidskr.*, 47: 248-251, 1926.
- MEYER, Christian Erich Hermann von. (1801-1869). *A., Ber. Senckenb. Nat. Ges.*, pp. 13-17, 1869; *A., Zool. Garten*, 10: 128, 1869; Kobell, W. X. F. von, *Sitzb. Bayr. Akad. Wiss. München*, 1: 403-407, 1870; Zittel, C. A., *Journ. Zool.*, 1: 95-96, 1872.
- MEYER, Felix. (1853-1926). Pfaff, G., et al., *P., Festschr. 50 Jahr. Bestehen Internat.*

- Ent. Ver. Frankfurt, p. 7, 1934; "K. A.", et al., *P.*, Ent. Ztschr., Frankfurt, 40: 33-34, 1926.
- MEYER, Wilhelm. (1854-1935). Urbahn, E., *P.*, Stett. Ent. Zeit., 96: i-iv, 1935.
- MEYER-DARCIS, Georges. ( -1914). Doebeli, S., Mitt. Schweiz. Ent. Ges., 12: 313-316, 1914.
- MEYER-DÜR, L. Rudolf. (1812-1885). *A.*, Ent. Mo. Mag., 21: 259, 1885; Dimmock, G., *Psyche*, 4: 266, 1885; Stierlin, G., *B.*, *P.*, Mitt. Schweiz. Ent. Ges., 7: 170-181, 1885; Mik, J., et al., Wien. Ent. Zeit., 4: 160, 1885; Frey, H., Mitt. Schweiz. Ent. Ges., 7: 263, 1886.
- MEYRICK, Edward. (1854-1938). Fletcher, T. B., *P.*, Ent. Record, 50: 49-51, 1938; Walker, J. J., Ent. Mo. Mag., 74: 136-137, 1938; Tams, W. H. T., *P.*, Entomologist, 71: 121-122, 1938; Busck, A., *P.*, Proc. Ent. Soc. Wash., 40: 177-179, 1938; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 5: 295, 1938; Hayward, K. J., Riv. Soc. Argentina, 10: 87-89, 1938; Janse, A. J. T., *P.*, Journ. Ent. Soc. S. Afr., 1: 151-155, 1939; *A.*, Indian Journ. Ent., 1: 128, 1939; Diakonoff, A., Tidschr. Ent., 81, (Verslag): lxxxv, 1938; Musgrave, A., *B.*, Bib. Austr. Ent. pp. 222-225, 1932; Bainbridge-Fletcher, T. B., et al., *B.* only, Moths of So. Africa, 4: (1): x-xxv, 1942.
- MIAL, Louis Compton. (1843-1921). "H. S.", Ent. Mo. Mag., 57: 93-94, 1921; Calvert, P. P., *B.*, Ent. News, 32: 191-192, 1921; Rothschild, L. W., Trans. Ent. Soc. Lond., (Proc.), pp. cxxix, 1921.
- MICHAILOVITCH, Nicolas. ( - ). *A.*, Ent. News, 30: 210, 1919; Moreau, E., Bull. Soc. Ent. France, p. 69, 1919.
- MICHELET, Jules. (1789-1874). *A.*, Nature, 2: 214-215, 1874.
- MIEG, Juan. (1779-1859). Dufour, L., *B.*, Ann. Soc. Ent. France, (4) 1: 17-20, 1861.
- MIERS, L. (1789-1879). *A.*, Ann. & Mag. Nat. Hist., (5) 4: 469-471, 1879; *A.*, Leopoldina, 16: 143, 1880.
- MIK, Joseph. (1839-1900). *A.*, Trans. Ent. Soc. Lond. (Proc.): xlv-xlv, 1900; Brauer, F., *B.*, *P.*, Wien. Ent. Zeit., 20: 1-7, 1901; Brauer, F., *P.*, Bot. & Zool. in Oesterr. 1850-1900 Festschr., pp. 347-348, 1901; *A.*, Ent. Nachr., 26: 363, 1900; Osten-Sacken, C. R., Record of my life and work in entomology, pp. 164-180, 1903; Kraatz, G., Deutsche Ent. Ztschr., 44: 9, 1900; *A.*, Zool. Anzeiger, 23: 680, 1900.
- MIKAN, Johann Christian. (1769-1814). *A.*, Lotus, 2: 63-65, 1852.
- MILES, William Henry. (1863-1930). Adkin, R. A., Entomologist, 63: 264, 1930.
- MILLET DE LA TURTAUDIÈRE, Pierre Aimé. (1783-1873). Fauvel, A., Annuaire Ent., 2: 122, 1874; Boreau, A., *B.*, Mem. Soc. Acad. Maine-et-Loire, 30: 1-6, 1874; *A.*, *B.*, Ann. Inst. Prov., (2) 9: 524-531, 1867.
- MILLIÈRE, Pierre. (1811-1887). *A.*, Ent. Mo. Mag., 24: 70-71, 1887; Constant, A., *B.*, (6) 7: 209-214, 1887; Heylaerts, F. J. M., Ann. Soc. Ent. Belg., 32, (C. R.): lxxiv-lxxvii, 1888; Kheil, N. M., Berlin. Ent. Ztschr., 31: 383-386, 1887.
- MILMAN, Edwin John. (1853-1940). "P. P. M.", Entomologist, 73: 70-71, 1940.
- MILNE EDWARDS, Henry. (See under Edwards.)
- MILNER, William. (1821-1867). Newman, E., 3: 248b, 1867.
- MINGAZZINI, Pio. (1864-1905). Stefanelli, P., Bull. Soc. Ent. Ital., 37: 97-106, 1905.
- MINGEE, William Malcolm. ( - ). Cockerham, K. L., Journ. Econ. Ent., 19: 418-419, 1926.
- MINOT, Charles Sedgwick. (1852-1914). Morse, E. S., *B.*, *P.*, Biog. Mem. Nat. Acad. Sci., 9: 263-285, 1920; Calvert, P. P., Ent. News, 26: 47-48, 1915; Osborn, H., Fragments Ent. Hist., pp. 206-207, 1937.
- MITCHELL, Joseph Daniel. (1850-1922). Howard, L. O., Mo. Let. Bur. Ent. Dept. Agr., 94: 1, 1922; Bailey, V., *P.*, Journ. Mammalogy, 4: 48-49, 1923; Geiser, S. W., Naturalists of the frontier, p. 329, 1937.
- MITIS, Heinrich von. (1845-1905). Rebel, H., *B.*, Verh. Zool.-Bot. Ges. Wien, 55: 267-269, 1905.
- MIYAKE, Tsunekata. (1880-1921). *A.*, Ent. News, 32: 160, 1921; *A.*, Science, n. s., 53: 234, 1921; "N. M.", Entomologist, 54: 128, 1921; Rothschild, L. W., Trans. Ent. Soc. Lond., (Proc.), p. cxxx, 1921.

- MLOKOSSEVICH, Ludwig Frantsovich. ( -1909). *Semenov-Tian-Shansky, A.* Rev. Russe Ent., 9: 344, 1909.
- MINISZECH, Georges Vandalin von. ( -1881). *A.*, Zool. Anzeiger, 5: 148, 1882; *A.*, Amer. Nat., 16: 65, 1882.
- MÖBIUS, Karl. (1825-1908). Hanstein, R. von, Naturw. Rundschau, 23: 361-363, 373-375, 1908; *A.*, Wien. Ent. Zeit., 27: 254, 1908; Horn, W., Deutsche Ent. Ztschr., p. 538, 1908; *A.*, Zool. Anzeiger, 33: 96, 1908.
- MOCQUERYS, Emile. ( -1916). *A.*, Bull. Soc. Ent. France, p. 277, 1916.
- MOCQUERYS, Simon. (1792-1879). *A.*, Proc. North. Ent. Soc., 2: 311, 1879; *A.*, Pet. Nouv. Ent., 2: 311, 1879; Fauvel, A., Annuaire Ent., pp. 121-122, 1880.
- MOCÁRY, Alexander (Sandor). (1841-1915). Viereck, H. L., Ent. News, 33: 157-158, 1922; *A.*, Wien. Ent. Zeit., 35: 128, 1916; Csiki, E., B., Rovart. Lapok (Hung.), 17: 162-175, 1910; l. c. 18: 27, 1911; Mocsáry, S., Rovart. Lapok (Hung.), 19: 81-113, 127-128, 1912; Musgrave, A., Bib. Austr. Ent., pp. 227-228, 1932; Soldanski, H., Deutsche Ent. Ztschr., p. 87, 1916.
- MODIGLIANI, Elío. (1860-1932). Vinciguerra, D., B., P., Ann. Mus. Civ. Stor. Nat. Genova, 56: 122-129, 1932; Gestro, R., l. c., 56: 143-154, 1932; Hanitsch, R., l. c., 56: 48-92, 1932.
- MOESER, Frank E. (1869-1914). Bird, H., Ent. News, 25: 335, 1914; Bird, H., Can. Ent., 46: 268, 1914.
- MOFFAT, John Alston. (1825-1904). Bethune, C. J. S., Can. Ent., 36: 84, 1904; Bethune, C. J. S., Ann. Rpt. Ent. Soc. Ont., 35: 109-110, 1904; l. c., P. only, 31: 5, 1900; *A.*, Leopoldina, 40: 56, 1904.
- MOFFETT, Thomas. (1553-1604). Weiss, H. B., Sci. Mo., 24: 559-566, 1927.
- MOHL, Hugo von. (1805-1872). *A.*, Leopoldina, 10: 34-39, 1874; Locy, W. A., P., Story of Biol., pp. 390-392, 1925.
- MOKRZECKI, Zygmunt Atanazy. (1865-1936). Czyzewski, J. A., B., P., Bull. Ent. Pologne, 14-15: 1-80, 1935-36; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 224, 1936; "R. B.", Anzeiger f. Schädlingssk., 4: 37, 1928; Howard, L. O., P., Hist. Applied Ent., 1930.
- MOLESCHOTT, Jacob Albert Willibrord. (1822-1893). Nordenskiöld, Erik, Hist. of Biol., pp. 449-450, 1935.
- MOLINA, Juan Ignacio. (1740-1829). Porter, C. E., et al., P., Rev. Chilena Hist. Nat., 33: 7-14, 169-170, 214-216, 223-225, 428-488, 1929; Hernandez, J., P., Rev. Chilena Hist. Nat., 44: 2-3, 1940.
- MOLLENKAMP, Wilhelm. (1846-1913). Kuhn, P., Deutsche Ent. Ztschr., p. 226, 1913.
- MÖLLER, Alfred. (1860-1922). Calvert, P. P., Ent. News, 38: 262, 1927; Falck, R., P., Hausschwamm-Forschungen, 9: 1-11, 1927.
- MÖLLER, Gustaf Fredrik. (1826-1889). Nerén, C. H., B., P., Ent. Tidskr., 10: 181-190, 1889.
- MONBEIG, Jean Théodore. (1875-1914). Oberthür, C., P., Études Lép. Comp., 11: unpagéd, 1916.
- MONCREIFFE, Thomas. (1822-1879). White, F. B., Entomologist, 12: 232, 1879; Stainton, H. T., Ent. Mo. Mag., 16: 118-119, 1879; *A.*, Naturaliste, 1: 111, 1879; *A.*, Zool. Anzeiger, 2: 480, 1879.
- MONELL, Joseph Tarrigan. (1859-1915). Davis, J. J., B., P., Ent. News, 26: 380-383, 1915; Davis, J. J., Journ. Econ. Ent., 8: 503, 1915; Osborn, H., P., Fragments Ent. Hist., pp. 213-214, 1937.
- MONTANDON, Arnold Lucien. ( -1922). *A.*, Ent. News, 34: 255, 1923; Méquignon, A., Bull. Soc. Ent. France, p. 198, 1922; *A.*, Ent. Mo. Mag., 59: 39, 1923; Desneux, J., Bull. Soc. Ent. Belg., 4: 123, 1922; Musgrave, A., B., Bib. Austr. Ent., pp. 228-229, 1932.
- MONTALEGRE, Abraham. (1883-1928). Porter, C. E., B., P., Rev. Chilena Hist. Nat., 32: 345-347, 1928.
- MONTGAUDRY, Baron de. ( -1857). Hamet, H., Apiculteur, 2: 97, 1858.
- MONTGOMERY, Thomas Harrison, Jr. (1873-1912). *A.*, P., Ent. News, 23: 239-240, 1912.
- MONTILLOT, Louis. ( -1902). *A.*, Leopoldina, 39: 86, 1903.

- MONTROUZIER, Xavier. (1821-1897). Grouvelle, A. H., *Bull. Soc. Ent. France*, p. 233, 1897.
- MOORE, Frederic. (1830-1907). *A.*, *Ent. Mo. Mag.*, 43: 162, 1907; Fruhstorfer, H., *P.*, *Ent. Wochenbl.*, 24: 151-152, 1907; Distant, W. L., *Zoologist*, (4) 11: 239, 1907; Horn, W., *Deutsche Ent. Ztschr.*, p. 535, 1907; *A.*, *Leopoldina*, 43: 88, 1907; Waterhouse, C. O., *Trans. Ent. Soc. Lond.*, (Proc.), p. xcvi, 1907; Musgrave, A., *Bib. Austr. Ent.*, p. 228, 1932; "A. D.", *Proc. Linn. Soc. Lond.*, p. 56, 1907-08.
- MOQUIN-TANDON, Horace Benedict Alfred. (1804-1863). *A.*, *Amer. Journ. Sci.*, (2) 36: 401, 1863; Crosse, H., et al., *Journ. Conchyl.*, (2) 4: 867, 1864; Clos, D., *B.*, *Mém. Acad. Toulouse*, (6) 2: 5-46, 1864; Michon, J., *Bull. Soc. Imp. Zool. Acclim.*, (2) 1: xlix-lviii, 1864.
- MORAWITZ, Ferdinand. (1827-1896). *Meldola, R.*, *Trans. Ent. Soc. Lond.*, (Proc.), p. xcv, 1896; *Semenov, A., B., P.*, *Horae Soc. Ent. Ross.*, 31: i-x, 1897.
- MORDWILKO, Alexander Konstantin. (1867-1938). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 5: 295, 1938; *Borodin, D. N., B., P.*, *Ann. Ent. Soc. Amer.*, 33: 487-494, 1940.
- MORE, Alexander Goodman. (1830-1895). *A., P.*, *Journ. Botany (Lond.)*, 33: 225-227, 1895; *Barrington, R. M., B., P.*, *Irish Nat.*, 4: 109-116, 1895.
- MOREY, Frank. (1858-1925). "J. G.", *Proc. Linn. Soc. Lond.*, pp. 91-92, 1925-26.
- MORICE, Francis David. (1849-1926). *A.*, *Ent. News*, 38: 32, 96, 1927; *Laing, F., P.*, *Ent. Mo. Mag.*, 62: 268-269, 1926; *A.*, *Ent. Record*, 38: 144, 1926; *A.*, *Entomologist*, 59: 328, 1926; *Poulton, E. B.*, *Proc. Ent. Soc. Lond.*, 1: 75-76, 1926; *Heddicke, H.*, *Deutsche Ent. Ztschr.*, pp. 359-360, 1926; *A.*, *Science*, n. s., 64: 524, 1926; *Musgrave, A.*, *Bib. Austr. Ent.*, p. 229, 1932.
- MORREN, Charles Francois Antoine. (1807-1858). *Lacordaire, J. T.*, *Ann. Acad. Belg.*, 25: 207-214, 1859; *Morren, E., B., P.*, *Ann. Acad. Belg.*, 26: 167-251, 1860.
- MORRIS, Francis Orpen. (1810-1893). *A.*, *Entomologist*, 26: 144, 1893; *A.*, *Ent. Mo. Mag.*, 29: 73, 1893.
- MORRIS, John Goodlove. (1803-1895). *A.*, *Ent. News*, 6: 273-274, 1895; *A.*, *Nat. Cyclop. Amer. Biog.*, 3: 61, 1897; *Smith, J. B., P.*, *Pop. Sci. Mo.*, 76: 471, 1910; *Wade, J. S.*, *Proc. Ent. Soc. Wash.*, 38: 127, 1936; *Osborn, H., P.*, *Fragments Ent. Hist.*, pp. 167-168, 1937.
- MORRISON, Herbert Knowles. (1854-1885). *A.*, *Ent. Amer.*, 1: 100, 1885; *Mann, B. P.*, *Psyche*, 4: 287, 1885; *A.*, *Science*, 5: 532, 1885; *Essig, E. O., P.*, *Hist. of Ent.*, pp. 709-710, 1931; *Osborn, H., P.*, *Fragments Ent. Hist.*, 1937.
- MORS, Louis Auguste Remacle. (1826-1884). *Dimmock, G.*, *Psyche*, 4: 266, 1885; *Fairmaire, L.*, *Ann. Soc. Ent. France*, (6) 4: 367-368, 1884.
- MORSE, Albert Pitts. (1863-1936). *A.*, *Ent. News*, 47: 228, 1936; *Palmer, T. S.*, *Auk*, 53: 372-373, 1936; *Dow, R., B., P.*, *Psyche*, 44: 1-11, 1937; *Mickel, C. E.*, *Ann. Ent. Soc. Amer.*, 30: 182-183, 1937; *Essig, E. O., P.*, *Hist. of Ent.*, pp. 710-712, 1931; *Osborn, H.*, *Fragments Ent. Hist.*, p. 272, 1937.
- MORTIMER, Charles Henry. ( -1932). *Blair, K. G.*, et al., *Ent. Mo. Mag.*, 68: 279, 1932.
- MORTON, Alexander. (?1855-1907). *Musgrave, A.*, *Bib. Austr. Ent.*, p. 230, 1932; *A.*, *Proc. Roy. Soc. Tasmania*, pp. xlvii-xlix, 1906-07.
- MORTON, Emily L. (1841-1920). *Newcomb, H. H., P.*, *Ent. News*, 28: 97-101, 1917; *Newcomb, H. H.*, *Ent. News*, 31: 149-150, 1920.
- MORTON, Kenneth J. (1858-1940). *Fraser, F. C.*, *Entomologist*, 73: 143-144, 1940; *Calvert, P. P.*, *Ent. News*, 51: 73, 1940; *Fraser, F. C.*, et al., *Ent. News*, 51: 237-240, 1940; *Killington, F. J.*, *Ent. Mo. Mag.*, 76: 141-142, 1940.
- MÖSCHLER, Heinrich Benno. (1831-1888). *Staudinger, O.*, *Stett. Ent. Zeit.*, 50: 133-137, 1889; *Christoph, H., B.*, *Berlin. Ent. Ztschr.*, 33: 193-196, 1889.
- MOSHER, Franklin Herbert. (1861-1925). *Burgess, A. F.*, *Journ. Econ. Ent.*, 18: 562, 1925.
- MOTSCHULSKY, Victor Ivanovich. (?1810-1871). *Newman, E.*, *Entomologist*, 6: 56, 1872; *Becker, A.*, et al., *Insekten-Börse*, 22: 4, 14, 1905; *Horn, W.*, *Ent. Mitteil.*, 16: 1-9, 93-98, 1927; *Solsky, M. S., B.*, *Horae Soc. Ent. Rosse*, 6 (Suppl.): 1-

- 118, 1868; Wallace, A. R., *Trans. Ent. Soc. Lond.*, (Proc.): lii, 1871; Dow, R. P., *Bull. Bklyn. Ent. Soc.*, 9: 99-101, 1914; Dohrn, C. A., *Stett. Ent. Zeit.*, 33: 73, 1872; Musgrave, A., *Bib. Austr. Ent. p.* 231, 1932; Marseul, S. A. de, B., *L'Abeille*, 24: 164-170, 1886-87; Essig, E. O., B., *P.*, *Hist. of Ent.*, pp. 712-715, 1931.
- MOUFET, Thomas. (1553-1604). Miall, L. C., *Early naturalists, their lives and work*, pp. 84-87, 1912; Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, pp. 243-244, 1823.
- MOUFFLET, Alfred. (1821-1866). Deyrolle, H., *Ann. Soc. Ent. France*, (4) 6: 607-610, 1866.
- MOULTON, John Coney. (1886-1926). *A.*, *Ent. Mo. Mag.*, 62: 242, 1926; *A.*, *Entomologist*, 59: 232, 1926; Poulton, E. B., *Proc. Ent. Soc. Lond.*, 1: 76-77, 1926.
- MRAZ, Jaro. (?1880-1927). Obenberger, J., *Acta Soc. Ent. Cechosl.*, 24: 77-80, 1927.
- MÜHLEN, Max von zur. (1850-1918). Schneider, G., *Korrespondenzbl. Naturf.-Ver. Riga*, (5)-(6), 1927.
- MÜHLIG, Johann Gottfried Gottlieb. (1813-1884). *A.*, *Psyche*, 4: 236, 1884.
- MUIR, Frederick Arthur Godfrey. (1872-1931). *A.*, *Ent. News*, 43: 56, 1932; Walker, J. J., *Ent. Mo. Mag.*, 67: 160-162, 1931; China, W. E., *Entomologist*, 64: 166-168, 1931; Davis, J. J., *Ann. Ent. Soc. Amer.*, 25: 250-251, 1932; Eltringham, H., *Proc. Ent. Soc. Lond.*, 6: 107-108, 1932; Musgrave, A., B., *Bib. Austr. Ent.*, pp. 231-232, 1932; Swezey, O. H., et al., B., *Journ. Pan-Pacific Res. Inst.*, 6 (3): 2-10, 1931; Williams, F. X., et al., B., *P.*, *Proc. Haw. Ent. Soc.*, 8: 13-15, 141-152, 1932; Imms, A. D., *Nature*, 127: 900, 1931; Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930; Osborn, H., *P.*, *Fragments Ent. Hist.*, pp. 185-186, 1937.
- MULDER, Claas. (1796-1867). Ermerins, J. W., B., *Jaarb. Konink. Akad. Wetensch.*, pp. 1-21, 1867.
- MULDER, John Frederick. (1840-1921). *A.*, *Victorian Nat.*, 38: 138, 1922.
- MÜLLER, Arnold. (1884-1934). Ebner, R., *Konowia*, 14: 8, 1935.
- MÜLLER, A. Julius. ( -1926). Hedicke, H., *Deutsche Ent. Ztschr.*, p. 359, 1926; *A.*, *Wien. Ent. Zeit.*, 43: 194, 1926.
- MÜLLER, Ernst. (1864-1937). Michalk, O., *P.*, *Ent. Ztschr.*, Frankfurt, 51: 1-2, 1937.
- MÜLLER, Fritz. (Johann Friedrich Theodor). (1822-1897). Trimen, R., *Trans. Ent. Soc. Lond.*, (Proc.), pp. lxxviii-lxix, 1897.
- MÜLLER, Hermann. (1829-1883). Dunning, J. W., *Trans. Ent. Soc. Lond.*, (Proc.): xlvii-xlviii, 1883; *A.*, *Wien. Ent. Zeit.*, 2: 288, 1883.
- MÜLLER, Johannes Peter. (1801-1858). *A.*, *Kosmos*, 2: 110, 1858; Locy, W. A., *P.*, *Story of Biol.*, pp. 356-357, 451-457, 1925; Nordenskiöld, Erik, *P.*, *Hist. of Biol.*, pp. 382-388, 1935.
- MÜLLER, Otto Friedrich. (1730-1784). Henriksen, K. L., *P.*, *Ent. Meddel.*, 15: 58-67, 1922; Locy, W. A., *P.*, *Story of Biol.*, pp. 220-221, 1925; Nordenskiöld, Erik, *Hist. of Biol.*, pp. 426-427, 1935.
- MÜLLER, Philip Ludwig Statius. (1725-1776). *A.*, *Beschäft. Ges. Naturf. Freunde Berlin*, 2: 584-592, 1776.
- MÜLLER, Philip Wilbrand Jacob. (1772-1851). Westwood, J. O., *Trans. Ent. Soc. Lond.*, (2) 2 (Proc.): 53-54, 1852-53.
- MULLER, Roberto. (1859-1932). Hoffmann, C. C., *Anal. Inst. Biol. Univ. Nac. Mex.*, 3: 133-148, 1932.
- MULSANT, Etienne. (1797-1880). Fitch, E. A., *Entomologist*, 14: 46-47, 1881; Félix-Rollin, J. B., *Ann. Soc. Ent. France*, (5) 10: 403-412, 1880; Westwood, J. O., *Ent. Mo. Mag.*, 17: 189-190, 1881; *A.*, *Naturaliste*, 2: 319, 1880; Kraatz, G., *Deutsche Ent. Ztschr.*, 25: 337-338, 1881; Katter, F., *Ent. Nachr.*, 7: 36, 1881; *A.*, *Zool. Anzeiger*, 4: 120, 1881; Pouillaude, J., *P.*, *Insecta*, 8: 185-187, 1918; Tholin, A., *Rev. d'Ent.*, 5: 213, 1886; Musgrave, A., B., *Bib. Austr. Ent.*, p. 232, 1932; *A.*, *Amer. Nat.*, 15: 262, 1881; Marseul, S. A. de, L'Abeille, 20: 20-39, 1882; Tholin, A., *Rev. d'Ent.*, 5: 213, 1886; Essig, E. O., *P.*, *Hist. of Ent.*, pp. 715-717, 1931.
- MUNSTER, Thomas. (1855-1938). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 5: 186, 1938; Hansen, V., *P.*, *Ent. Meddel.*, 20: 188, 1938; *A.*, *Bull. Soc. Ent. France*,



- 43: 105, 1938; Kangas, E., *Ann. Ent. Fenn.*, 4: 187, 1938; *A.*, *Koleopt. Rundschau*, 24: 121, 1938.
- MURAT, Marc. (1909-1940). Maire, R., *P.*, *Bull. Soc. Hist. Nat. Afr. du Nord*, 32: 155-157, 1941.
- MURRAY, Andrew. (1812-1878). *A.*, *Amer. Nat.*, 12: 197, 1878; *A.*, *Ann. Rpt. Ent. Soc. Ont.*, 9: 24-25, 1878; *A.*, *Can. Ent.*, 10: 32-34, 1878; Westwood, J. O., *Trans. Ent. Soc. Lond.*, (Proc.), p. xxxix, 1877; *A.*, *Ent. Mo. Mag.*, 14: 215-216, 1878.
- MURRAY, James. (1872-1942). Day, F. H., *Ent. Mo. Mag.*, 78: 120, 1942; Day, F. H., et al., *P.*, *North Western Nat.*, 17: 115-116, 1942.
- MURRAY, William. ( -1885). *A.*, *Ann. Rpt. Ent. Soc. Ont.*, 16: 23, 1886; *A.*, *Can. Ent.*, 17: 78, 1885.
- MURTFELDT, Mary Esther. (1848-1913). Schwarz, H., *P.*, *Ent. News*, 24: 241-242, 1913; *A.*, *P.*, *Journ. Econ. Ent.*, 6: 288-289, 1913; *A.*, *Can. Ent.*, 45: 157, 1913; Howard, L. O., *P.*, *Hist. Applied Ent.*, 1930; Osborn, H., *P.*, *Fragments Ent. Hist.*, pp. 165-166, 1937.
- MUSSON, Charles Tucker. (1856-1928). Browne, W. R., *Proc. Linn. Soc. N. S. Wales*, 54: vii, 1929; Musgrave, A., *Bib. Austr. Ent.*, p. 235, 1932.
- MUTCH, John Pratt. (1855-1934). Sheldon, W. G., *Entomologist*, 67: 263-264, 1934.
- MUTTKOWSKI, Richard Anthony. (1887-1943). Calvert, P. P., *Ent. News*, 54: 173-174, 1943; *A.*, *Ann. Ent. Soc. Amer.*, 37: 135, 1944.
- MÜTZELL, Max. (1818-1887). Dimmock, G., *Psyche*, 5: 36, 1888; Honrath, E. G., *Berlin. Ent. Ztschr.*, 31: 145, 1887; *A.*, *Berlin. Ent. Ztschr.*, 31: xxxiii-xxxiv, 1887.
- MYERS, Paul Revere. (1888-1925). Walton, W. R., et al., *B.*, *P.*, *Proc. Ent. Soc. Wash.*, 27: 65-67, 1925; *A.*, *Ent. News*, 36: 192, 1925.
- NÄGELI, Alfred. (1863-1935). "V. A.", *P.*, *Mitt. Schweiz. Ent. Ges.*, 16: 613-614, 1935.
- NARDO, Giovanni Domenico. (1802-1877). Pirona, G. A., *B.*, *Attit. Istit. Veneto*, (5) 4: 785-850, 1877-78; Behn, W. F. G., *Leopoldina*, 14: 17, 1878; *A.*, *Ber. Senckenb. Nat. Ges.*, p. 10, 1877-78.
- NAUFOCK, Albert. (1878-1937). Alberti, B., *Ent. Ztschr.*, Frankfurt, 51: 105, 1937; *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 4: 242, 1937; Reisser, H., *B.*, *P.*, *Ztschr. Österr. Ent. Ver.*, 22: 53-55, 1937.
- NAVARRO DE ANDRADE, Edmundo. (1881-1941). Borgmeier, T., *P.*, *Rev. Ent. (Rio de J.)*, 13: 182-188, 1942; *A.*, *Rev. Ent. (Rio de J.)*, 12: 681, 1941.
- NAVAS, Longinos. (1858-1938). *A.*, *Bull. Soc. Ent. France*, 44: 38, 1939; *A.*, *A-b. morph. taxon. Ent. Berlin-Dahlem*, 6: 188, 1939; *A.*, *Bull. Mus. Paris*, (2) 11: 204, 1939; *A.*, *Boll. Soc. Ent. Ital.*, 71: 153, 1939; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 236-237, 1932; *A.*, *Rev. Ent. (Rio de J.)*, 10: 731, 1939; Porter, C. E., *B.*, *P.*, *Rev. Chilena Hist. Nat.*, 38: 208-213, 1934; Porter, C. E., *P.*, *Rev. Chilena Hist. Nat.*, 43: 91-93, 1939; Campos, F., *B.*, *Rev. Chilena Hist. Nat.*, 43: 151-154, 1939.
- NEBEL, Ludwig. (1861-1911). Heidenreich, E., *Deutsche Ent. Ztschr.*, p. 592, 1911.
- NEES VON ESENBECK, Christian Gottfried Daniel. (1776-1858). Winkler, H., *Naturw. Wochenschr.*, 36: 337-346, 1921; Kieser, D. G., *B.*, *Verh. Kais. Leop.-Carol. Deutsch. Akad. Naturf.*, 27: lxxxv-xcvii, 1860; *A.*, *P.*, *Illustrierte Zeit.*, 30: 345-347, 1858.
- NEIVA, Arthur. (1880-1943). Borgmeier, T., et al., *P.*, *Rev. Ent. (Rio de J.)*, 14: 1-30, 1943; *A.*, *Rev. Ent. (Rio de J.)*, 10: 483, 1939; Borgmeier, T., *P.*, *Rev. Ent. (Rio de J.)*, 11: 1-104, 1940; Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930; Lent, H., *B.*, *P.*, *Rev. Brasil. Biol.*, 3: 273-291, 1943; *A.*, *P.*, *Mem. Inst. Butantan*, 17: 2 pp., (unpaged), 1943.
- NELL, Philip. (1857-1923). Skinner, H., *Ent. News*, 35: 35, 1924.
- NELSON, James Allen. (1875-1941). Phillips, E. F., *Ent. News*, 53: 59-60, 1942; Phillips, E. F., *Ann. Ent. Soc. Amer.*, 35: 125-126, 1942; Osborn, H., *Fragments Ent. Hist.*, p. 273, 1937.
- NEUMOEGEN, Berthold. (1845-1895). *A.*, *Leopoldina*, 31: 58, 1895; Weiss, H. B.,



- Journ. N. Y. Ent. Soc., 51: 291, 1943; *A., P.*, Ent. News, 6: 65-66, 1895; *A.*, Ent. Record, 6: 191, 1895; Osborn, H., *Fragments Ent. Hist.*, pp. 143-144, 1937.
- NEUWYLER (NEUVILLIER), Melchior. (1819-1845). Wolf, M., *Ann. Soc. Ent. France*, (2) 3, (Bull.): cv-cvii, 1845.
- NEVERMANN, William Heinrich Ferdinand. (Guillermo Enrique Fernando). (1881-1938). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 5: 295, 1938; *A.*, Ent. News, 49: 239-240, 1938; *A.*, Science, 88: 74, 1938; *A.*, Rev. Agr. Costa Rica, 10: 334-345, 1938; *A.*, Rev. Ent. (Rio de J.), 9: 264, 1938; *A.*, Ent. Blätter, 34: 243, 1938.
- NEVINSON, Edward Bonney. (1858-1927). Gardner, W., Ent. Record, 40: 80, 1928; Riley, N. D., Entomologist, 61: 168, 1928; Gardner, W., Ent. Mo. Mag., 64: 117-118, 1928.
- NEWBERRY, Emanuel Augustus. (1845-1927). *A.*, Ent. Mo. Mag., 64: 15-16, 1928.
- NEWELL, Wilmon. (1878-1943). Creighton, J. T., *P.*, Journ. Econ. Ent., 36: 947-949, 1943; *A.*, Science, 98: 400, 1943; Watson, J. R., *P.*, Florida Ent., 26: 53-54, 1943; Osborn, H., *P.*, *Fragments Ent. Hist.*, 1937; Watson, J. R., *Ann. Ent. Soc. Amer.*, 37: 135-136, 1944; Mowry, H., Science, 99: 377-378, 1944.
- NEWMAN, Edward. (1801-1876). *A.*, Amer. Nat., 10: 700, 1876; *A.*, Ent. Mo. Mag., 13: 45-46, 1876; Westwood, J. O., Trans. Ent. Soc. Lond., (Proc.), pp. xlii-xliii, 1876; *A.*, Ent. Nachr., 2: 131, 1876; *A.*, Pet. Nouv. Ent., 2 (152): 55, 1876; *A.*, *P.*, Zoologist, (2) 11: 4973, 1876; *A.*, Entomologist, 9: v-xxiv, 1876; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 237-238, 1932.
- NEWPORT, George. (1803-1854). Newman, E., *B.*, Trans. Ent. Soc. Lond., (Proc.), pp. 51-53, 1854; Locy, W. A., *Story of Biol.*, pp. 272-273, 1925.
- NICÉVILLE, Charles Lionel Augustus de. (1852-1901). *A.*, Ent. Mo. Mag., 38: 41, 1902; Fowler, W. W., Trans. Ent. Soc. Lond., (Proc.), pp. xxxiv-xxxv, 1901; Martin, L., Deutsche Ent. Ztschr., 14: 381-386, 1901; *A.*, Journ. Bombay Nat. Hist. Soc., 14: 140-141, 1902-03.
- NICKERL, Franz Anton. (1813-1871). *A.*, Lotus, 21: 46-48, 1871; *A.*, Stett. Ent. Zeit., 32: 318-320, 1871; *A.*, Verh. Geol. Reichsanst. Wien, p. 66, 1871; Vávra, V., *B.*, *P.*, Acta Ent. Mus. Prag., 1: 3-12, 1923; Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- NICKERL, Otokar. (1838-1920). Vávra, V., *B.*, *P.*, Acta Ent. Mus. Prag., 1: 3-12, 1923; Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- NIELSEN, Emil. (1876-1938). Braendegaard, J., *P.*, Ent. Meddel., 20: 185-187, 1938; Henriksen, K. L., *B.*, Ent. Meddel., 15: 521-523, 1937.
- NIELSEN, Jens Christian. (1881-1918). Kryger, J. P., *B.*, *P.*, Ent. Meddel., 13: 1-11, 1919; Stamm, R. H., *B.*, *P.*, Vidensk. Meddel. Dansk. Naturh. For. Kobenh., 70: v-xi, 1919.
- NIEPOLT, Wilhelm. (1863-1936). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 300, 1936; Strand, E., *P.*, Ent. Ztschr., Frankfurt, 46: 173-175, 1932.
- NODIER, Charles. (1783-1844). Desmarest, E., Ann. Soc. Ent. France, (2) 3: 18-20, 1845; Portevin, G., La Terre et La Vie, 4: 370, 1934.
- NÖGGERATH, Johann Jacob. (1788-1877). Dechen, H. von, Verh. Ver. Preuss. Rheinl., 34: (Correspondenzbl.): 79-97, 1877; *A.*, Leopoldina, 13: 147-154, 1877.
- NORDENSTRÖM, Henning. ( -1919). Roman, A., *B.*, *P.*, Ent. Tidskr., 41: 139-141, 1920.
- NORDMAN, Alexander von. (1803-1866). Brandt, J. F., Verh. Mineral. Ges. Petersburg, (2) 6: 73-80, 1871; Hjelt, O. E., *B.*, Acta Soc. Sci. Fenn., 9 (2): 1-40, 1871; Nordenskiöld, Erik, Hist. of Biol., pp. 422-423, 1935.
- NORMAN, George. (1824-1882). *A.*, Ent. Mo. Mag., 19: 96, 1882.
- NORTON, Edward. (1823-1894). *A.*, *B.*, *P.*, Ent. News, 5: 161-163, 1894; *A.*, Psyche, 7: 138, 1894; *A.*, Insect Life, 6: 379, 1894.
- NOUGARET, Raymond Louis. (1866-1933). Essig, E. O., *B.*, *P.*, Journ. Econ. Ent., 26: 739-741, 1933.
- NOWICKI, Maximilian Sila. (1826-1890). Mik, J., Wien. Ent. Zeit., 9: 270, 1890; Wierzejski, A., *B.*, *P.*, Wien. Ent. Zeit., 10: 17-30, 1891; Grobben, K., Bot. & Zool. in Oesterr. 1850-1900 Festschr., p. 516, 1901.

- NÜSSLIN, Otto. ( -1915). *A.*, Wien. Ent. Zeit., 34: 68, 1915; *A.*, Ent. Blätter, 11: 127, 1915.
- NUTTALL, George Henry Falkiner. (1862-1937). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 5: 77, 1938; *A.*, Can. Ent., 70: 40, 1938; *A.*, Ent. News, 49: 80, 1938; *A.*, *P.*, Journ. Parasit., 24: 180-183, 1938; *P.* only, Herms, W. B., Medical entomology, 3rd ed., frontispiece, 1939; Howard, L. O., *P.*, Hist. of Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., p. 231, 1937.
- NYLANDER, William. (1822-1899). *A.*, Ent. Mo. Mag., 35: 148, 1899; *A.*, Deutsche Ent. Ztschr., 43: 222, 1899.
- OBERTHÜR, Charles. (1845-1924). *A.*, Ent. Record, 36: 115, 1924; Champion, G. C., Ent. Mo. Mag., 60: 191, 215-216, 1924; Green, E. E., Trans. Ent. Soc. Lond., (Proc.), p. clxii, 1924; Houlbert, C., *B.*, *P.*, Ann. Soc. Ent. France, 93: 163-178, 1924; Riley, N.D., Entomologist, 57: 191-192, 1924; Skinner, H., *P.*, Ent. News, 35: 267-269, 1924; Vlack, V., Acta Soc. Ent., Czechoslov., 21: 108, 1924; Musgrave, A., Bib. Austr. Ent., p. 242, 1932.
- OSCHENHEIMER, Ferdinand. (1767-1822). Strecker, H., *B.*, Butterflies and moths of N. A., p. 258, 1878.
- OETTL, Johann Nepomuk. (1801-1866). Zacke, W., Jahresb. Ver. Bienenzucht Böhmens, pp. 57-63, 1868.
- OGIER DE BAULNY, Ferdinand Marie. (1839-1870). Simon, E., Ann. Soc. Ent. France, (5) 1: 122-124, 1871; *A.*, Pet. Nouv. Ent., 3: 117, 1871.
- OKADA, Juzo. (1875-1936). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 242, 1937.
- OKEN, Lorenz. (1779-1851). Sachse, C. T., Allgem. Deutsche Naturh. Zeit., 2: 463-465, 1847; *A.*, Natur, 6: 398-399, 1880; Hepp, A., Ent. Ztschr., Frankfurt, 43: 145, 1929; Nordenskiöld, Erik, *P.*, Hist. of Biol., pp. 287-289, 1935; Schuster, J., *P.*, 5: 249-250, 1929.
- OLAFSSON, Eggert. (1726-1768). Henriksen, K. L., Ent. Meddel., 15: 79, 1922.
- OLDENBERG, Lorenz. (1863-1931). Collin, J. E., Ent. Mo. Mag., 68: 17, 1932.
- OLDHAM, Charles. (1868-1942). Cash, J. J., *P.*, North Western Nat., 17: 12-13, 1942; Lloyd, B., et al., *P.*, North Western Nat., 17: 117-124, 1942.
- OLIVEIRO, Manuel Lopez de, Filho. (1872-1938). Borgmeier, R., *P.*, Rev. Ent., (Rio de J.), 8: 441-442, 1938.
- OLIVIER, Guillaume Antoine. (1756-1814). Dow, R. P., Bull. Bklyn. Ent. Soc., 8: 39, 1913; *I. c.*, 9: 9-10, 1914; Swainson, W., Bib. of Zool., pp. 279-281, 1840; Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., pp. 258-259, 1823; Marsoul, S. A. de, L'Abeille, 22: 121-124, 1884; *P.* only, Insecta, 7: (73-84); cover, 1917; Essig, E. O., *P.*, Hist. of Ent., pp. 719-721, 1931.
- OLIVIER, Joseph Ernest. (1844-1914). *A.*, Ent. News, 25: 240, 1914; *A.*, Ent. Mo. Mag., 50: 67, 1914; *A.*, Ent. Record, 26: 144, 1914; Pic, M., *B.*, *P.*, Ann. Soc. Ent. France, 83: 443-457, 1914; Alluaud, C., Bull. Soc. Ent. France, p. 69, 1914; Musgrave, A., Bib. Austr. Ent., pp. 243-244, 1932; Kuhn, P., Deutsche Ent. Ztschr., p. 228, 1914; *A.*, *B.*, *P.*, Miscellanea Ent., 22 (1-2): 6-7, 1914.
- OLIVEIRA, Emmanuel Paulinus d'. (1837-1899). *A.*, *B.*, *P.*, Broteria, 11: 5-14, 1913.
- OLLIFF, Arthur Sidney. (1865-1895). *A.*, Ent. Mo. Mag., 32: 66-67, 1896; Guthrie, F. B., *B.*, Agr. Gaz. N. S. Wales, 7: 1-4, 1896; Meldola, R., Trans. Ent. Soc. Lond., (Proc.), p. xcii, 1896; Howard, L. O., Smiths. Misc. Coll., 84: 395-396, 1930; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 244-247, 1932.
- OLSEN, Emil. (1858-1931). Kryger, J. P., *P.*, Ent. Meddel. (Copenhagen), 18: 205-208, 1932.
- ONSLow, Victor A. H. Huia. (1890-1922). Cockayne, E. A., Ent. Record, 34: 148, 1922.
- OPIZ, Philipp Maximilian. (1787-1858). Dvorsky, F., Lot's, 8: 152-158, 1858.
- ORBIGNY, Alcide Dessalines d'. (1802-1857). Fischer, P., *B.*, Bull. Soc. Géol. France, (3) 6: 434-453, 1878.
- ORBIGNY, Charles Dessalines d'. (1806-1876). Musgrave, A., Bib. Austr. Ent., p. 247, 1932.
- ORBIGNY, Henri d'. (1845-1915). Rabaud, E., Bull. Soc. Ent. France, p. 201, 1915;

- Bouvier, E. L., *Bull. Mus. Paris*, 29: 412, 1923; Bedel, M., *Livre du Cent. Soc. Ent. France*, pp. 95-99, 1932; Wheeler, W. M., *P.*, (trans. of *l. c.*), *Quart. Review Biol.*, 8: 325-330, 1933.
- ORD, George. (1781-1866). Rhoads, S. N., *P.*, *Cassinia*, 12: 1-8, 1908.
- ORMANCEY, Pedro. (1811-1852). Mulsant, E., *B.*, *P.*, *Ann. Soc. Linn. Lyon*, n. s., 1: 77-80, 1853.
- ORMEROD, Eleanor Anne. (1828-1901). *A.*, *P.*, *London News*, 99: 334, 1891; *l. c.* *A.*, *P.*, 119: 122, 1901; *Autobiography and correspondence*, *P.*, (R. Wallace ed.), 348 pp., 1904; Bethune, C. J. S., *B.*, *P.*, *Ann. Rpt. Ent. Soc. Ont.*, 32: 121-125, 1901; Woolf, V., *Dial.*, 77: 466-474, 1924; *A.*, *Cent. Hist. Ent. Soc. Lond.*, pp. 155-156, 1933; Fowler, W. W., *Trans. Ent. Soc. Lond.*, (Proc.), p. xxxiv, 1901; Bethune, C. J. S., *Can. Ent.*, 33: 155-156, 1901; *l. c.*, *P.*, 33: 241-242, 1901; Lampa, S., *Ent. Tidskr.*, 22: 183-186, 1901; Newman, T. P., *Entomologist*, 34: 235-236, 1901; *A.*, *Ent. Mo. Mag.*, 37: 230, 1901; Howard, L. O., *P.*, *Hist. Applied Ent.*, 1930.
- ORMEROD, Georgiana Elizabeth. (1823-1896). Bethune, C. J. S., *Ann. Rpt. Ent. Soc. Ont.*, 27: 112-113, 1896; Bethune, C. J. S., *Can. Ent.*, 28: 290, 1896; Meldola, R., *Trans. Ent. Soc. Lond.*, (Proc.), p. xciii, 1896.
- ORSINI, Antonio. ( - ). "P. S.", *Bull. Soc. Ent. Ital.*, 2: 209, 1870.
- OSKAR, John. (1875-1935). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 2: 63, 1935.
- OSTEN SACKEN, Charles Robert. (1828-1906). Aldrich, J. M., *P.*, *Ent. News*, 17: 269-272, 1906; Johnson, C. W., *Ent. News*, 17: 273-275, 1906; *A.*, *Can. Ent.*, 35: 344-346, 1903; Bethune, C. J. S., *Can. Ent.*, 38: 238, 1906; Smith, J. B., *Pop. Sci. Mo.*, 76: 473, 1910; Verrall, G. H., *Ent. Mo. Mag.*, 42: 234-235, 1906; Osten Sacken, C. R., *Introduction to Record of my Life Work in Entomology*, Cambridge, Mass., pp. 1-26, 1901; *Record of my Life Work in Entomology*, *P.*, 240 pp., 1903-04; *A.*, *Leopoldina*, 42, 99, 1906; Semenov-Tian-Shansky, A., *Rev. Russe Ent.*, 16: 406-409, 1916; Musgrave, A., *B.*, *Bib. Austr. Ent.*, p. 248, 1932; Verrall, G. H., *Entomologist*, 39: 192, 1906; Lameere, A., *Ann. Soc. Ent. Belg.*, 50: 161, 1906; Bryan, G. H., *Nature*, 74: 180-181, 1906; Korschelt, E., *Verh. Deutsch. Zool. Ges.*, 17: 19-20, 1907; Kusnezov, N. J., *P.*, *Rev. Russe Ent.*, 6: 382-383, 1906; Essig, E. O., *P.*, *Hist. of Ent.*, pp. 724-727, 1931; Osborn, H., *P.*, *Fragments Ent. Hist.*, pp. 141-142, 1937.
- OSTERBERGER, Bullion Alphonse. (1901-1939). Eddy, C. O., *Journ. Econ. Ent.*, 32: 893-894, 1939.
- OTTO, Paul von. (1869-1939). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 6: 349, 1939.
- OTOLENGUI, Rodriguez. ( -1937). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 4: 241, 1937.
- OUDEMANS, Johannes Theodorus. (1862-1934). Weber, M., *B.*, *P.*, *Tidskr. Ent.*, 75: i-xvi, 1932; Meijere, J. C. H. de, *B.*, *P.*, *Tijdschr. Ent.*, 77: 167-174, 1934; *A.*, *Lambillionea*, 34: 53, 1934.
- OVSYANNIKOV, Filipp Vasilevich. (1827-1906). Kusnezov, N. J., *Rev. Russe Ent.*, 6: 383, 1906.
- OWEN, Francis. ( -1880). Carrington, J. T., *Entomologist*, 13: 312, 1880.
- OWEN, Richard. (1804-1892). Nordenskiöld, Erik, *P.*, *Hist. of Biol.*, pp. 414-417, 1935; Locy, W. A., *Story of Biol.*, pp. 353-354, 1925.
- PABST, Moritz. (1833-1908). Schauffuss, C., *Ent. Wochenbl.*, 25: 124, 1908.
- PACK, Herbert J. (1892-1930). Osborn, H., *Fragments Ent. Hist.*, pp. 218-219, 1937.
- PACKARD, Alpheus Spring. (1839-1905). *A.*, *Can. Ent.*, 37: 111-112, 1905; *A.*, *P.*, *Ent. News*, 16: 97-98, 1905; Barus, C., *Science*, n. s., 21: 404-406, 1905; Benjamin, M., *P.*, *Harper's Weekly*, 34: 925-926, 1890; Cockerell, T. D. A., *B.*, *P.*, *Biog. Mem. Nat. Acad.*, 9: 181-236, 1920; Henshaw, S., *B.*, *Ent. Writings*, U. S. Dept. Agr. Div. Ent. Bull. (o. s.), 16: 1-44, 1887; Kingsley, J. S., *P.*, *Pop. Sci. Mo.*, 33: 145, 260-267, 1888; Mead, A. D., *P.*, *Pop. Sci. Mo.*, 67: 43-48, 1905; Smith, J. B., *P.*, *Pop. Sci. Mo.*, 76: 473, 1910; Smith, J. B., *P.*, *Psyche*, 12: 33-35, 1905; Kingsley, J. S., *Science*, 21: 401-404, 1905; Kirby, W. F., *Entomologist*,

- 38: 143-144, 1905; Holland, W. J., *Ent. Mo. Mag.*, 41: 140-141, 1905; Howard, L. O., *P.*, *Hist. Applied Ent.*, 1930; Essig, E. O., *B.*, *P.*, *Hist. of Ent.*, pp. 727-729, 1931; Osborn, H., *P.*, *Fragments Ent. Hist.*, pp. 147-148, 1937.
- PAGENSTECHER. (1837-1913). "L. B. P.", *Ent. Mo. Mag.*, 49: 278, 1913; Kuhnt, P., *Deutsche Ent. Ztschr.*, pp. 474-475, 1913; Musgrave, A., *Bib. Austr. Ent.*, p. 248, 1932; "H.", *P.*, *Deutsche Ent. Ztschr. Iris*, 27: 140-142, 1913.
- PAGET, Charles John. (1811-1844). Paget, J., *Trans. Norfolk & Norwich Nat. Soc.*, 6: 74-76, 1895.
- PALCHEVSKII, Nikolai Alexandrovich. ( -1909). Semenov-Tian-Shansky, A., *Rev. Russe Ent.*, 9: 344, 1909.
- PALLAS, Peter Simon. (1741-1811). Strecker, H., *B.*, *Butterflies and moths of N. A.*, p. 259, 1878; Nordenskiöld, Erik, *Hist. of Biol.*, pp. 262-263, 1935.
- PALLIARDI, Anton Alois. (1799-1873). *A.*, *B.*, *Leopoldina*, 9: 98-99, 1874.
- PALM, Charles. (1836-1917). *A.*, *P.*, *Journ. N. Y. Ent. Soc.*, 25: 237-238, 1917; *A.*, *Ent. News*, 29: 159, 1918; Weiss, H. B., *Journ. N. Y. Ent. Soc.*, 51: 290-291, 1943.
- PALMER, Edward. (1821-1911). *A.*, *Ent. News*, 22: 239, 1911; Stafford, W. E., *P.*, *Pop. Sci. Mo.*, 78: 341-354, 1911.
- PANDELLÉ, Louis. (1824-1905). Gobert, E., *Ann. Soc. Ent. France*, 74: 287-288, 1905.
- PANTEL, José. (1853-1920). *A.*, *Ent. News*, 31: 210, 1920; Foulquier, J. H., *Science*, n. s., 52: 266-267, 1920; Achard, J., *Bull. Soc. Ent. France*, p. 37, 1920; Cunha, J. M. da, *B.*, *Broteria (Ser. Zool.)*, 19: 23-29, 1921; Navas, L., *B.*, *P.*, *Bol. Soc. Ent. Espan.*, 3: 105-108, 1920.
- PANTON, J. Hoyes. ( -1898). *A.*, *Ann. Rpt. Ent. Soc. Ont.*, 29: 105, 1898; *A.*, *Can. Ent.*, 30: 77-78, 1898.
- PANZER, Georg Wolfgang Franz. (1755-1829). Strecker, H., *B.*, *Butterflies and moths of N. A.*, p. 259, 1878; Swainson, W., *B.*, *Bib. of Zool.*, p. 287, 1840; Sturm, J., *Faunus*, 1: 51, 1832; *A.*, *Flora, Botanische Zeit.*, 12 (1): 400, 1829; Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, pp. 261-262, 1823.
- PARFITT, Edward. (1820-1892). *A.*, *Ent. Mo. Mag.*, 29: 73, 1893.
- PARIS, Auguste Simon. (1794-1869). Reiche, L., *B.*, *Ann. Soc. Ent. France*, (4) 9: 599-600, 1869.
- PARKES, Walter Randall. (1905-1932). "C. de W.", *Entomologist*, 65: 96, 1932.
- PARRY, Frederick John Sidney. (1810-1885). Dimmock, G., *Psyche*, 4: 266, 1885; *A.*, *Ent. Mo. Mag.*, 21: 240, 1885; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 249-250, 1932.
- PASCOE, Francis Polkinghorne. (1813-1893). *A.*, *Ent. News*, 5: 128, 1894; McLachlan, R., *Ent. Mo. Mag.*, 29: 194-196, 1893; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 250-252, 1932; *A.*, *Proc. Linn. Soc. Lond.*, p. 33, 1893-94; Kraatz, G., *Deutsche Ent. Ztschr.*, 38: 9-10, 1894; Rowe, J. H., *Ann. Rpt. Roy. Cornwall Polytechn. Soc.*, 6 (2): 159, 1928.
- PASQUALE, Giuseppe Antonio. (1820-1893). Paladino, G., *B.*, *Atti Accad. Pont. Naples*, 23, (Commém.) : 1-16, 1893.
- PASSERINI, Carlo. (1793-1857). Tappes, G., *Ann. Soc. Ent. France*, (3) 6: 187-192, 1858; "V. A.", *P.*, *Ann. Mus. Fis. e Stor. Nat. Firenze*, 1857, pp. 209-222, 1858; *A.*, *B.* only, *Bull. Soc. Ent. Ital.*, 2: 103-104, 1870; Howard, L. O., *Hist. of Applied Ent.*, p. 248, 1930.
- PASSERINI, Giovanni. (1816-1893). *A.*, *Bull. Soc. Ent. Ital.*, 25: 218, 1893; Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930.
- PATTEN, William. (1861-1932). Gerould, J. H., *Science*, 76: 481-482, 1932.
- PATTERSON, Alice McDougall. ( -1935). Spencer, G. J., *Proc. Ent. Soc. Br. Columbia*, 34: 63, 1938.
- PATTERSON, John P. (1835-1898). *A.*, *Ent. News*, 9: 104, 1898.
- PATTERSON, Robert. (1802-1872). *A.*, *Nature*, 5: 332, 1872.
- PATTON, William Hampton. (1853-1918). Britton, W. E., et al., *B.*, *P.*, *Ent. News*, 32: 33-40, 1921; Osborn, H., *Fragments Ent. Hist.*, pp. 221-222, 1937.
- PAULSEN, Fernando. (1842-1908). Porter, C. E., *B.*, *P.*, *Rev. Chilena Hist. Nat.*, 34: 114-115, 1930.
- PAULY, August. (1850-1914). Röhre, A., *B.*, *P.*, *Ent. Blätter*, 10: 129-135, 1914.

- PÁVEL, János. (1842-1901). Lajos, A. A., *P.*, Rovart. Lapok, 8: 132-136, 1901.
- PAVESI, Pietro. (1844-1907). Camerano, L., *B.*, Boll. Mus. Zool. Anat. Comp. Univ. Torino, 22 (575): 1-15, 1907; Vinciguerra, D., *B.*, *P.*, Ann. Mus. Civ. Stor. Nat. Genova, 43: 579-586, 1907-08.
- PAYKULL, Gustaf von. (1757-1826). Swainson, W., *B.*, Bib. of Zool., p. 288, 1840; Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., p. 265, 1823.
- PEALE, Titian Ramsey. (1800-1885). *A.*, *P.*, Ent. News, 24: 1-3, 1913; *A.*, Appleton's Cyclop. Amer. Biog., 4: 691, 1888; Dimmock, G., Psyche, 4: 266, 1885; Lucas, F. A., *P.*, Amer. Mus. Journ., 17: 211-212, 1917; Peale, A. C., Bull. Phil. Soc. Wash., 14: 317-326, 1901; Stone, W., *P.*, Cassinia, 19: 1-13, 1915; Strecker, H., *B.*, Butterflies and moths of N. A., pp. 259-260, 1878; Osborn, H., *P.*, Fragments Ent. Hist., p. 25, 1937.
- PECCHIOI, Victor. ( -1870). *A.*, Boll. Comit. Geol. d'Ital., 1: 317-318, 1870.
- PECIRKA, Jaromir. ( -1933). Obenberger, J., *P.*, Acta Soc. Ent. Cechoslov., 30: 9-10, 1933.
- PECK, George W. (1837-1909). *A.*, Can. Ent., 41: 220, 1909.
- PECK, William Dandridge. (1763-1822). *A.*, Mass. Hist. Soc. Coll. (2) 10: 161-170, 1843; *A.*, Boston Daily Adv., 35 (81) (whole no. 2902): 2, Oct. 8, 1822; Dow, R. P., Bull. Bklyn. Ent. Soc., 8: 71, 1913; Goode, G. B., Ann. Rpt. Smithsn. Inst. 2 (2): 403, 426, 1901; Kelly, H. A., et al., Amer. Med. Biog., pp. 900-901, 1920; Kelly, H. A., Cyclop. Amer. Med. Biog., 2: 260-261, 1912; Morris, J. G., Amer. Journ. Sci., 1: 19-20, 1846; Quincy, J., Hist. of Harvard Coll., 2: 329-330, 1840; Winsor, J., Memorial Hist. of Boston, 4: 518-519, 1881; Howard, L. O., Ann. Rpt. Smithsn. Inst., pp. 388-389, 1930; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Essig, E. O., *B.*, *P.*, Hist. of Ent., pp. 729-732, 1931; Osborn, H., *P.*, Fragments Ent. Hist., 1937.
- PECKHAM, George William. (1845-1914). *A.*, Ent. News, 25: 96, 1914; Muttkowski, R. A., *P.*, Ent. News, 25: 145-148, 1914; *A.*, Nat. Cyclops. Amer. Biog., 12: 347, 1904; Osborn, H., Fragments Ent. Hist., pp. 142-143, 1937.
- PENNANT, Thomas. (1726-1798). Fée, A. L. A., Mem. Soc. Sci. Lille, 1: 185-186, 1831 (1832).
- PERCHERON, Achille Rémi. (1797-1869). Swainson, W., *B.*, Bib. of Zool., p. 291, 1840; Musgrave, A., Bib. Austr. Ent., p. 253, 1932.
- PEREYASLAVTSEVA, Sof'ya Mikhailovna. (1851-1903). Kuznezov, N. I., Rev. Russe Ent., 3: 422, 1903.
- PEREZ, Jean. (1833-1914). Alluaud, C., Bull. Soc. Ent. France, p. 434, 1914; *A.*, *B.*, Ann. Soc. Ent. France, 85: 355-366, 1916; *A.*, Miscellanea Ent., 22 (10): 50, 1915.
- PEREZ ARCAS, Laureano. (1824-1894). *A.*, Leopoldina, 31: 218, 1895; *A.*, Ent. Mo. Mag., 31: 196, 1895; Martínez y Sáez, D. F. de P., *B.*, *P.*, Anal. Soc. Espan. Hist. Nat., 23 (Actes): 278-296, 1894.
- PERGANDE, Theodore. (1840-1916). *A.*, *B.*, Ent. News, 27: 240, 291, 1916; *A.*, Science, n. s., 43: 492, 1916; Bigson, A., Can. Ent., 48: 213-214, 1916; Wade, J. S., Proc. Ent. Soc. Wash., 38: 129, 1936; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Essig, E. O., *B.*, *P.*, Hist. of Ent., pp. 733-734, 1931; Osborn, H., *P.*, Fragments Ent. Hist., p. 180, 1937.
- PÉRINQUEY, Louis Albert. ( -1924). *A.*, Ent. News, 35: 190, 262, 1924; *A.*, Nature, 113: 541, 1924; Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- PERKINS, Vincent Robert. (1831-1922). Perkins, R. C. L., Ent. Mo. Mag., 58: 110-111, 1922; *A.*, Ent. Record, 34: 115, 1922.
- PERON, Francois. (1775-1810). Swainson, Bib. of Zool., pp. 291-292, 1840; Iredale, T., Austr. Mus. Mag., 3: 357-359, 1929; Musgrave, A., Bib. Austr. Ent., pp. 254-255, 1932.
- PERRIN, Joseph. (1864-1936). McLaine, L. S., Can. Ent., 69: 19-20, 1937.
- PERRIS, Edouard. (1808-1878). Laboulbène, A., *B.*, *P.*, Ann. Soc. Ent. France, (5) 9: 373-388, 1879; Kraatz, G., Deutsche Ent. Ztschr., 22: 226-227, 1878; Lichtenstein, W. A. J., Ent. Nachr., 4: 274, 1878; *A.*, Ent. Mo. Mag., 14: 263, 1878; Fauvel, A., Annuaire Ent., pp. 116-117, 1879; Mulsant, E., *B.*, *P.*, Ann. Soc. Linn. Lyon, n. s., 25: 85-110, 1878.

- PERROUD, Benoit Philibert. (1796-1878). Kraatz, G., *Deutsche Ent. Ztschr.*, 22: 227-228, 1878; *A.*, *Petit Nouv. Ent.*, 2 (191): 212, 1878; Fauvel, A., *Annuaire Ent.*, p. 119, 1878; Mulsant, E., *B., P.*, *Ann. Soc. Linn. Lyon*, n. s., 25: 271-281, 1878; *l.c.*, 26: 109-120, 1879; Musgrave, A., *Bib. Austr. Ent.*, p. 255, 1932.
- PERTY, Joseph Anton Maximilian. (1804-1884). *A.*, *Psyche*, 4: 236, 1884; *A.*, *Wien. Ent. Zeit.*, 3: 224, 1884.
- PESCATORE, Gustav. ( -1916). Soldanski, H., *Deutsche Ent. Ztschr.*, p. 227, 1916.
- PETAGNA, Luigi. (1779-1832). Costa, O. G., *Trans. Ent. Soc. Lond.*, 4 (Proc.), p. xviii, 1845-47; Vulpes, D. B., *Atti Real Istit. Incorrag. Sci. Nat. Napoli*, 5: 287-310, 1834.
- PETAGNA, Vincenzo. (1734-1810). Costa, O. G., *Trans. Ent. Soc. Lond.*, 4 (Proc.), pp. xvii-xviii, 1845-47; *A.*, *B.*, *Atti Real Istit. Incorrag. Sci. Nat.*, Napoli, 2: pp. 340-342, 1818.
- PETERS, Wilhelm. (1815-1883). Türckheim, H. von, Berlin. *Ent. Ztschr.*, 27: ii, 1883.
- PETERSDORFF, Emil. (1836-1915). Belling, H., *Deutsche Ent. Ztschr.*, pp. 322-324, 1917.
- PETERSEN, Wilhelm. (1854-1933). Meyer, W., *Stett. Ent. Zeit.*, 94: 331-332, 1933; Dampf, A., *Beitr. Kunde Estlands*, 18: 1-4, 1933; Kusnezov, N. J., *B., P.*, *Rev. d'Ent. URSS*, 27: 139-142, 1937; *A.*, *Ent. Record*, 45: 142, 1933; Hellén, W., *P.*, *Notulae Ent.*, 13: 50-52, 1933.
- PETTIT, Johnson. ( -1898). *A.*, *Can. Ent.*, 30: 108, 1898; *A.*, *Ann. Rpt. Ent. Soc. Ont.*, 29: 105, 1898.
- PETZ, Josef. (1866-1926). Heikertinger, F., *Wien. Ent. Zeit.*, 43: 47, 1926.
- PEYR, Josef. (1862-1936). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 4: 242, 1937; *A.*, *Ent. Ztschr.*, Frankfurt, 51: 41, 1937.
- PFAFF, Svend Willemoes. (1920-1939). Wolff, N. L., *Ent. Meddel.*, 20: 586-587, 1940.
- PFEIFFER, Ludwig. (1878-1926). "A. H.", *B., P.*, *Ent. Ztschr.*, Frankfurt, 40: 269-271, 1926.
- PFITZNER, Rudolf. (1864-1921). Seitz, A., *Ent. Rundschau*, 38: 15, 1921.
- PHILIPPI, Federico. ( -1910). Porter, C. E., *B., P.*, *Rev. Chilena Hist. Nat.*, 14: 19-23, 1910.
- PHILIPPI, Rudolph Amandus. (1808-1904). Weise, J., *Deutsche Ent. Ztschr.*, p. 173, 1905; Porter, C. E., *B., P.*, *Rev. Chilena Hist. Nat.*, 8: 174-177, 1904; Ochsenius, C., *B.*, *Leopoldina*, 42: 16-20, 39-40, 53-56, 59-66, 1906.
- PHILIPPIEV, Victor Ivan. (1857-1906). Kusnezov, N. J., *Rev. Russe Ent.*, 6: 383-384, 1906.
- PHILIPTSCHENKO, Julius. (1882-1930). *A.*, *B.*, *Ent. News*, 42: 95-96, 1931.
- PHILPOTT, Alfred. ( - ). Eltringham, H., *Proc. Ent. Soc. Lond.*, 6: 108, 1932.
- PHIPPS, Clarence Ritchie. (1895-1933). Patch, E., *B., P.*, *Journ. Econ. Ent.*, 26: 920-922, 1933; Hungerford, H. B., *Ann. Ent. Soc. Amer.*, 27: 122-123, 1934.
- PIAGET, Edouard. (1817-1910). *A.*, *Ent. News*, 22: 288, 1911; Veth, H. J., *B., P.*, *Tijdschr. Ent.*, 54: 128-133, 1911; Musgrave, A., *Bib. Austr. Ent.*, p. 255, 1932.
- PICARD, Francois. (1879-1939). Berland, L., *B.*, *Ann. Soc. Ent. France*, 108: 173-181, 1939.
- PICART, Pierre Francois. (1810-1836). Feisthamel, J. F. de, *Ann. Soc. Ent. France*, 8: 587-594, 1839.
- PICCIOLI, Ferdinando. (1821-1900). Bargagli P., *B.*, *Bull. Soc. Ent. Ital.*, 32: 217-228, 1900.
- PICKARD-CAMBRIDGE, Frederick Octavius. (1861-1905). Banks, E. R., *Ent. Mo. Mag.*, 41: 97, 1905.
- PICKARD-CAMBRIDGE, Octavius. (1828-1917). *A.*, *Ent. News*, 28: 384, 1917; *l. c.*, 29: 302, 1918; Pickard-Cambridge, A. W., *Ent. Mo. Mag.*, 53: 114-115, 1917; Turner, H. J., *P.*, *Ent. Record*, 29: 89-91, 1917; Rowland-Brown, H., *Entomologist*, 50: 96, 1917; Pickard-Cambridge, A. W., *P.*, *Proc. Dorset Nat. Hist. Club*, 38: xli-xliii, 1918; *A.*, *Proc. Bournemouth Nat. Sci. Soc.*, 9: 17, 1918; *A.*, *Proc. Roy. Soc. Lond.*, (B) 91: xlix-liii, 1920; *A.*, *Physis*, 3: 313, 1917.
- PICKERING, Charles. (1805-1878). Scudder, S. H., *Psyche*, 6: 57-60, 121-124, 137-141, 169-172, 185-187, 297-298, 345-346, 357-358, 1891.



- PICTET, A. Edouard. (1835-1878). *A.*, Ent. Mo. Mag., 16: 24, 1879; Saussure, H. de, Naturaliste, 1: 134, 1879; *A.*, Mitt. Schweiz. Ent. Ges., 5: 555-556, 1880; *A.*, Deutsche Ent. Ztschr., 23: 8, 1879; Dunning, J. W., Trans. Ent. Soc. Lond. (Proc.), p. lxiii, 1879.
- PICTET, (de la Rive), Francois Jules. (1809-1872). *A.*, Pet. Nouv. Ent., 4 (97): 197, 1872; *A.*, Ent. Mo. Mag., 8: 294-295, 1872; Gervais, P. J., Journ. Zool., 1: 98-99, 1872; Kobell, W. X. F., Sitzb. Akad. Wiss. Math-Phys. Cl., 3: 121-124, 1873; Soret, J. L., B., Arch. Sc. Phys. & Nat. (Genève), 43: 342-413, 1872; *A.*, Act. Soc. Helvet. Sci. Nat., 55th Sess., pp. 361-387, 1872; Westwood, J. O., Trans. Ent. Soc. Lond. (Proc.): L, 1872.
- PIERCE, Frank Nelson. (1861-1943). *A.*, Ent. Record, 55: 70, 1943; "W. M.", Entomologist, 76: 175-176, 1943.
- PIERRET, Alexandre. (1814-1850). Doué, A., Ann. Soc. Ent. France, (2) 8: 351-360, 1850.
- PIESZCZEK, Adolf. ( -1928). Hepp, A., Ent. Ztschr., 43: 29, 1929.
- PILATE, Louis. (1816-1852). Sallé, A., Ann. Soc. Ent. France, (2) 10 (Bull.): L, 1852.
- PINCKNEY, John Stuart. (1901-1940). Hill, C. C., Journ. Econ. Ent., 34: 131, 1941.
- PINKER, Rudolf. (1847-1934). Heikertinger, F., Koleopt. Rundschau, 21: 55-56, 1935; Horn, W., Arb. morph. taxon. Ent. Berlin-Dahlem, 2: 63, 1935.
- PIOCHARD DE LA BRULERIE, Charles. (1845-1876). Simon, E., Ann. Soc. Ent. France, (5) 6: 677-688, 1876; *A.*, Pet. Nouv. Ent., 2 (152): 55, 1876; *A.*, Ent. Nachr., 2: 130-131, 1876.
- PIPER, Charles Vancouver. (1867-1926). Osborn, H., Fragments Ent. Hist., p. 201, 1937.
- PIRAZZOLI, Odoardo. ( -1884). Kraatz, G., Deutsche Ent. Ztschr., 28: 438, 1884; Mik, J., et al., Wien. Ent. Zeit., 3: 128, 1884.
- PISO, Guilielmus (Willem). (1611-1678). Locy, W. A., Story of Biol., pp. 303-304, 1925.
- PLATEAU, Felix. (1841-1911). *A.*, B., Ent. News, 22: 239-240, 1911; Janet, A., Bull. Soc. Ent. France, p. 101, 1911.
- PLATH, Otto Emil. (1885-1940). *A.*, Ent. News, 52: 30, 1940; *A.*, Rev. Ent. (Rio de J.), 12: 416, 1941.
- PLIENINGER, Theodor Wilhelm Heinrich. (1795-1879). *A.*, Leopoldina, 15: 165-167, 1879; *A.*, Zool., Jahresber., p. 5, 1879.
- PLINY (Caius Plinius Secundus). (23-79). Weiss, H. B., Journ. N. Y. Ent. Soc., 34: 355-359, 1926; Locy, W. A., *P.*, Story of Biol., pp. 48-61, 1925; Crichton, A., *P.*, Jardine's Nat. Library, 9: 17-82, 1844.
- PLÖTZ, Carl. (1813-1886). Dimmock, G., Psyche, 5: 36, 1888; McLachlan, R., Trans. Ent. Soc. Lond., (Proc.), p. lxx, 1886; Musgrave, A., B., Bib. Austr. Ent., p. 257, 1932.
- POEPPIG, Eduard Friedrich. (1798-1868). *A.*, Wissensch. Beiträge Leipzig. Zeit., pp. 365-367, 1868.
- POEY, Felipe. (1799-1891). *A.*, Ent. Mo. Mag., 27: 134, 1891; "F.", Krancher's Ent. Jahrb., p. 197, 1892; Quiroga y Rodriguez, F., *P.*, Actas Soc. Hist. Nat. Espan., 20: 127-132, 1891; *A.*, Ent. News, 2: 80, 1891; *A.*, Insect Life, 3: 429, 1891; Osborn, H., K., Fragments Ent. Hist., pp. 30-31, 1937.
- POGGE, Paul. ( -1884). Kolbe, H. J., Berlin. Ent. Ztschr., 28: 213, 214, 1884.
- POKORNY, Alois. (1826-1887). Burgerstein, A., B., Verh. Zool.-Bot. Ges. Wien, 37: 673-678, 1887.
- POKORNY, Frantisek. (1865-1935). Novak, J., B., *P.*, Acta Soc. Ent. Cechoslov., 32: 145-146, 1935.
- PONTOPPIDAN, Eric. (1698-1764). Henriksen, K. L., *P.*, Ent. Meddel., 15: 72-73, 1922; Strand, E., Arch. Naturg., A 83: (7): 151-153, 1917 (1919).
- POPENOE, Charles Holcomb. (1884-1933). Graf, J. E., et al., *P.*, Proc. Ent. Soc. Wash., 36: 67, 1934; Osborn, H., Fragments Ent. Hist., p. 276, 1937.
- POPENOE, Edwin Alonzo. (1855-1913). *A.*, Ent. News, 25: 240, 1914; Britton, W. E., Journ. Econ. Ent., 7: 155, 1914; Dean, G. A., Journ. Kansas Ent. Soc., 7: 36, 1934; Osborn, H., *P.*, Fragments Ent. Hist., 1937.



- POPPIUS, Bertil Robert. (1876-1916). *A.*, Ent. News, 28: 338, 1917; Bergroth, E., Ent. Mo. Mag., 53: 19, 1917; Levander, K. M., *P.*, Luonnon Ystäv. 20: 234-236, 1916; *A.*, Wien. Ent. Zeit., 37: 178, 1918; Musgrave, A. B., Bib. Austr. Ent., p. 258, 1932.
- POPPIUS, Karl Alfred. (1846-1920). *A.*, Notulae Ent., 1: 25-26, 1921.
- PORKKA, Osmo Hannu. (1901-1939). *A.*, Ann. Ent. Soc. Fenn., 6: 4, 6, 1940.
- POKORNY, Emanuel. (1838-1900). Mik, J., Wien. Ent. Zeit., 19: 136, 1900.
- PORRITT, George Taylor. (1848-1927). Walker, J. J., *P.*, Ent. Mo. Mag., 63: 69, 76-78, 1927; *A.*, Entomologist, 60: 73-75, 1927; Walker, J. J., Proc. Linn. Soc. Lond., pp. 92-93, 1926-27; Calvert, P. P., Ent. News, 38: 261, 1927; Turner, H. J., Ent. Record, 39: 48, 1927; Collin, J. E., Proc. Ent. Soc. Lond., 2: 104, 1927.
- PORTCHINSKY, Josifa Aloizievich. (1848-1916). Semenov-Tian-Shanskij, A., *P.*, Rev. Russe Ent., 16: 404-406, 1916; Pavlovsky, E. N., *P.*, Parasitology, 17: 402, 1925; Howard, L. O., *P.*, Hist. Applied Ent., 1930.
- PORTER, Carlos Emilio. ( -1942). "L. T.", Rev. Soc. Ent. Arg., 11: 485-486, 1943; *A.*, Journ. Econ. Ent., 36: 247, 1943; Anguita, B. F., *P.*, Rev. Chilena Hist. Nat., 25: xi-xxiv, 1921; Larrain, A. F., *P.*, Rev. Ent. (Rio de J.), 14: 321-324, 1943; *A.*, *P.*, Bol. Lab. Clinica Razetti, 3: 217-218, 1943; Howard, L. O., Hist. of Applied Ent., 1930.
- POUCHET, Felix Archimède. (1800-1872). *A.*, Journ. Zool., 1: 535-536, 1872; Beauvain, N., et al., *P.*, Bull. Soc. Amis Sci. Nat. Rouen, (2) 13: 175-229, 1877.
- POULTON, Edward Bagnall. (1856-1943). *A.*, Ent. News, 55: 18, 1944; Rowland-Brown, H., *P.*, Entomologist, 45: 270, 1912.
- POUPART, Francois. (1661-1709). Miall, L. C., Early naturalists, their lives and work, p. 229, 1912.
- POWER, John Arthur. (1810-1886). McLachlan, R., Trans. Ent. Soc. Lond., (Proc.), pp. lxxviii-lxix, 1886; Fowler, W. W., Ent. Mo. Mag., 23: 44-45, 1886; Dunning, J. W., *B.*, *P.*, Entomologist, 19: 193-200, 1886.
- PRADIER, Jules. (1807-1858). Lafont, E., Ann. Soc. Ent. France, (3) 6 (Bull.): ccvii-ccviii, 1858.
- PRATT, Frederick C., (1869-1911). Hunter, W. D., Proc. Ent. Soc. Wash., 13: 189-190, 1911.
- PREISS, Paul. (1859-1938). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 5: 186, 1938; Koleopt. Rundschau, 24: 121, 1938.
- PRENTISS, Edwin Charles. (1848-1880). Mann, B. P., Psyche, 3: 128, 1880.
- PREUDHOMME DE BORRE, Francois Paul Charles Alfred. (1833-1905). Lameere, A., *P.*, Ann. Soc. Ent. Belg., 50: 7-11, 1906; *A.*, Leopoldina, 41: 44, 1905; Musgrave, A., Bib. Austr. Ent., p. 259, 1932.
- PRIDDEY, T. G. (1845-1901). *A.*, Ent. News, 12: 192, 1901.
- PRITCHARD, Andrew. (1804-1882). *A.*, Zool. Anzeiger, 6: 80, 1883; *A.*, Amer. Nat., 17: 231-232, 1883.
- PROCHNOW, Oskar. (1884-1934). *A.*, Koleopt. Rundschau, 21: 57, 1935; Horn, W., Arb. morph. taxon. Ent. Berlin-Dahlem, 1: 310, 1934.
- PROUT, Louis Beethoven. ( -1943). Cockayne, E. A., Ent. Record, 56: 28, 1944; Breyer, A., Rev. Arg. de Ent., 2 (4): 72, 1944.
- PROVANCHER, Léon. (1820-1892). *A.*, *P.*, Ent. News, 6: 209, 1895; "W. H. H.", Ann. Rpt. Ent. Soc. Ont., 23: 1892; "W. H. H.", Can. Ent., 24: 130-131, 1892; Maheux, G., Ann. Rpt. Ent. Soc. Ont., 53: 28-30, 1922; Essig, E. O., *P.*, Hist. of Ent., pp. 734-735, 1931; Osborn, H. P., Fragments Ent. Hist., 1937.
- PRYER, Henry James Stovin. (1850-1888). *A.*, Ent. Mo. Mag., 24: 227-278, 1888; Dimmock, G., Psyche, 5: 156, 1889; Sharp, D., Trans. Ent. Soc. Lond., (Proc.): xlix, 1888.
- PSOTA, Frank J. ( -1936). Mickel, C. E., Ann. Ent. Soc. Amer., 31: 121, 1938; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 300, 1936.
- PUCKETT, Felix S. (1885-1941). Porter, B. A., Journ. Econ. Ent., 34: 592, 1941.
- PUENGLER, Rudolf. (1858-1927). Pfaff, G., et al., *P.*, Festschr. 50-jähr. Bestehen Internat. Ent. Ver. Frankfurt, p. 6, 1934; *A.*, Ent. Record, 45: 142, 1933; Herin, M. B., Deutsche Ent. Ztschr., pp. 97-100, 1927.

- PULKKINEN, Antti Armas (Asko). (1885-1933). Valle, K. J., *P.*, *Notulae Ent.*, 13: 53-54, 1933.
- PUNGUR, Julius. (1843-1907). Schaufuss, C., *Ent. Wochenbl.*, 24: 133, 1907; Horn, W., *Deutsche Ent. Ztschr.*, p. 535, 1907; *A.*, *Leopoldina*, 43: 71, 1907.
- PUTNAM, Joseph Duncan. (1855-1881). Mann, B. P., *Psyche*, 3: 312, 1882; Pratt, W. H., et al., *B.*, *P.*, *Proc. Davenport Acad. Sci.*, 3: 195-248, 1879-81 (1883); Howard, L. O., *P.*, *Hist. Applied Ent.*, p. 28, 1930; Osborn, H., *P.*, *Fragments Ent. Hist.*, pp. 158-159, 1937.
- PUTON, Jean Baptiste Auguste. (1834-1913). *A.*, *Miscellanea Ent.*, 21 (1): 5, 1913; *A.*, *Rev. Chilena Hist. Nat.*, 17: 196-197, 1913; Sainte-Claire Deville, J., *Bull. Soc. Ent. France*, p. 173, 1913.
- PUTZEYS, Jules Antoine Adolphe Henri. (1809-1882). Preudhomme de Borre, A., *B.*, *Ann. Soc. Ent. Belg.*, 26: i-viii, 1882; *A.*, *Zool. Anzeiger*, 5: 148, 1882; *A.*, *Amer. Nat.*, 16, 330, 1882; *A.*, *Ent. Mo. Mag.*, 18: 215-216, 1882; Musgrave, A., *Bib. Austr. Ent.*, p. 260, 1932.
- QUEDENFELDT, Max. (1851-1891). Honrath, E. G., *B.*, *Berlin. Ent. Ztschr.*, 36: 473-475, 1891; Reitter, E., *Wien. Ent. Zeit.*, 10: 276, 1891; *A.*, *Insect Life*, 5: 211-212, 1893.
- QUOY, Jean René Constantin. (1790-1869). Crosse, H., et al., *Journ. Conchyl.*, 18: 158, 1870; Richemond, L. de, *Ann. Acad. Rochelles*, 9: 231-238, 1868-69 (1870).
- RABENHORST, Gottlob Ludwig. (1806-1881). *A.*, *Leopoldina*, 17: 102, 1881.
- RADDE, Gustav Ferdinand Richard. (1831-1903). *A.*, *Wien. Ent. Zeit.*, 22: 108, 1903; Kraatz, G., *Deutsche Ent. Ztschr.*, 47: 7, 1903.
- RADEMACHER, Paul. (1843-1906). Dittich, R., *Ztschr. Ent. (Breslau)*, 32: L, 1907.
- RADOSZKOWSKI, Octavii Ivanovich Bourmeister-. (1820-1895). Portschinsky, I., *B.*, *P.*, *Horae Soc. Ent. Ross.*, 30: i-vi, 1896; Essig, E. O., *P.*, *Hist. of Ent.*, pp. 735-737, 1931.
- RAFFRAY, Achille. (1844-1923). Luigioni, P., *Boll. Soc. Ent. Ital.*, 55: 153-155, 1923.
- RAFINESQUE, Constantin Samuel. (1783-1840). Copeland, H. E., *Amer. Nat.* 10: 470-473, 1876; Fitzpatrick, T. J., *B.*, *P.*, *Rafinesque: A sketch of his life with bibliography*, pub. by Hist. Dept. of Iowa, 241 pp., 1911; Osborn, H., *B.*, *P.*, *Fragments Ent. Hist.*, pp. 25-26, 1937; Youmans, W. J., *P.*, *Pioneers of science in America*, pp. 182-195, 1896.
- RAGNOW, Hermann. (1862-1938). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 5: 296, 1938.
- RAGONOT, Émile Louis. (1843-1895). Holland, W. J., *Ent. News*, 7: 31-32, 1896; McLachlan, R., *Ent. Mo. Mag.*, 31: 287, 1895; Walsingham, T. de G., et al., *Trans. Ent. Soc. Lond.*, (Proc.), p. xxxvii, Meldola, R., *I. c.*, (Proc.), p. lxx, 1895; Herin, E., *B.*, *Stett. Ent. Zeit.*, 57: 209-217, 1896; Constant., A., *B.*, *P.*, *Ann. Soc. Ent. France*, 65: 1-18, 1896; Musgrave, A., *Bib. Austr. Ent.*, pp. 262-263, 1932.
- RAGUSA, Emile Enrico. ( -1924). Rambousek, F. J., *Acta Soc. Ent. Cechsllov.*, 21: 61, 1924; *A.*, *Boll. Soc. Ent. Ital.*, 56: 113, 1924; *A.*, *Bull. Soc. Ent. France*, p. 149, 1924.
- RAINBOW, William Joseph. (1856-1919). Fletcher, J. J., *Proc. Linn. Soc. N. S. Wales*, 45: 5, 1920; Musgrave, A., *B.*, *P.*, *Rec. Austr. Mus.*, 13: 87-91, 1920; *A.*, *Nature*, 105 (Apr.): 208, 1920; Steel, T., *Austr. Nat.*, 4: 128, 1920; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 263-264, 1932.
- RAMBOUSEK, Frantisek G. (1886-1931). Jedlicka, I. A., *P.*, *Acta Soc. Ent. Cechosl.*, 28: 109-111, 1931; Clermont, J., *B.*, *Ann. Soc. Ent. France*, 101: 333-336, 1932; Scheerpeltz, O., *B.*, *Koleopt. Rundschau*, 18: 65-66, 1932; Hetschko, A., *Wien. Ent. Zeit.*, 48: 218-219, 1931; Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930.
- RAMBUR, Jules Pierre. (1801-1870). Fauvel, A., *Annuaire Ent.*, 2: 122, 1874; Grashin, A., de, et al., *B.*, *Ann. Soc. Ent. France*, (5) 2: 297-312, 1872; Crosse, H., et al., *Journ. Conchyl.*, 25: 96, 1877.

- RANGNOW, Rudolf. (1889-1939). Sachtleben, H., Arb. morph. taxon. Ent. Berlin-Dahlem, 7: 76, 1940.
- RANSOM, Brayton Howard. (1879-1925). Hall, M. C., et al., *P.*, Proc. Ent. Soc. Wash., 27: 153, 1925; Hall, M. C., Amer. Journ. Trop. Med., 5: 389-392, 1925; Hall, M. C., *P.*, Journ. Amer. Med. Assoc., 68: 262-264, 1925; Wash. Post, Sept. 19, 1925.
- RANTZAU, Carl zu. (1822-1848). Boie, F., Stett. Ent. Zeit., 9: 129, -848; Henriksen, K. L., Ent. Meddel., 15: 193, 1926.
- RASMUSSEN, Johannes. (1869-1937). Jacobsen, A. G., Ent. Meddel., 20: 107, 1938.
- RATHKE, Jens. (1769-1855). Henriksen, K. L., Ent. Meddel., 15: 152-153, 1925.
- RATHKE, Martin Heinrich. (1793-1860). *A.*, Proc. Roy. Soc. Lond., 11: xxxvii-xl, 1860-62; Locy, W. A., Story of Biol., p. 356, 1925; Nordenskiöld, Erik, Hist. of Biol., pp. 366-368, 1935; Zaddach, G., B., Neue Preuss. Provinz.-Blätt., (3) 6: 271-312, 1860; Hoeven, J. van der, B., Nederl. Tijdschr. Geneesk., pp. 605-607, 1860; Zaddach, G., Schrift. Phys.-Ökon. Ges. Königsberg, 1 (Sitzb.): 29-31, 1860, 1861.
- RATHVON, Simon Snyder. (1812-1891). *A.*, Ent. News, 2: 80, 1891; Goding, F. W., *P.*, Penn. State Hort. Assoc. Official Doc. no. 4, 3 pp., no date; Calvert, P. P., Ent. News, 41: 234-236, 1930; *A.*, Insect Life, 3: 428-429, 1891; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., 1937.
- RATZBURG, Julius Theodor Christian. (1801-1871). *A.*, Pet. Nouv. Ent., 4: 197-198, 1872; Guérin-Mèneville, F. E., Rev. Mag. Zool., (2) 23: 157, 1871-72; Schenckling-Prévoit, C., *P.*, Insekten-Börse, 13: 239-241, 1896; Danckelmann, B., B., *P.*, Ztschr. Forst- u. Jagdwesen, 4: 307-323, 1872; Wallace, A. R., Trans. Ent. Soc. Lond. (Proc.), p. liii, 1871; Kraatz, G., Berlin. Ent. Ztschr., 15: viii, 1871; Dohrn, C., Stett. Ent. Zeit., 33: 81, 1872; Wallace, A. R., Entomologist, 6, 55-56, 1872.
- RAY, John. (1628-1705). Derham, W., B., *P.*, Memorials of Ray, pp. 1-220, 1844; Duncan, J., *P.*, Nat. Lib., 33: 17-70, 1858; Locy, W. A., *P.*, Biology and its makers, 3rd ed., pp. 115-118, 1915; Miall, L. C., Early naturalists, their lives and work, pp. 99-130, 1912; Strecker, H., Butterflies and moths of N. A., pp. 261-262, 1878; Locy, W. A., *P.*, Story of Biol., pp. 305-310, 1925; Nordenskiöld, Erik, Hist. of Biol., pp. 198-202, 1935; Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., p. 247, 1823.
- RAY, Jules. (1815-1883). Jourdeuille, C., Ann. Soc. Ent. France, (6) 3: 565-569, 1883.
- RAYNOR, Gilbert Henry. (1854-1929). Riley, N. D., Entomologist, 62: 239-240, 1929; Burrows, C. R. N., Ent. Record, 41: 139-140, 1929.
- RAYWARD, Arthur Leslie. (1866-1935). Sheldon, W. G., Entomologist, 68: 292, 1935; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 64, 1936.
- REAUMUR, René Antoine Ferchault de. (1683-1757). Peyerimhoff, P. de, *P.*, Livre du Cent. Soc. Ent. France, p. 2, 1932; Locy, W. A., *P.*, Story of Biol., pp. 262-264, 1925; Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., p. 247, 1823; Howard, L. O., *P.*, Hist. Applied Ent., 1930.
- REBEL, Hans. (1861-1940). Thomann, H., Mitt. Schweiz. Ent. Ges., 18: 286, 1941; *A.*, Ent. Record, 53: 56, 1941; *P.* only. Insektenbörse, 50, 15, 1933; *A.*, B., Ann. Naturh. Mus. Wien, 45: i-v, 1931.
- REDI, Francesco. (1626-1698). Miall, L. C., Early naturalists, their lives and work, pp. 225-228, 1912; Weiss, H. B., Sci. Mo., 23: 220-224, 1926; Nordenskiöld, Erik, Hist. of Biol., pp. 430-431, 1925; Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., p. 244, 1823; Howard, L. O., *P.*, Hist. Applied Ent., 1930.
- REDLICH, Hermann. ( -1903). *A.*, Festschr. 50-jähr. Bestehen Internat. Ent. Ver. Frankfurt, pp. 2-5, 1934.
- REDTENBACHER, Ludwig. (1814-1876). Kraatz, G., *P.*, Deutsche Ent. Ztschr., 20: x, 1876; "A. A. Z.", Ent. Nachr., 2: 46, 1876; *A.*, Stett. Ent. Zeit., 37: 205, 1876; *A.*, Ent. Mo. Mag., 12: 238, 1875-76; Westwood, J. O., Trans. Ent. Soc. Lond., (Proc.), pp. xliii-xliv, 1876; Ganglbauer, L., *P.*, Festschr. Zool.-Bot. Ges. Wien, p. 350, 1900; Musgrave, A., Bib. Austr. Ent., p. 265, 1932.
- REED, Edmund Baynes. (1837-1916). Bethune, C. J. S., *P.*, Ann. Rpt. Ent. Soc. Ont.,

- 33: 127-128, 1902; Bethune, C. J. S., *P.*, *Can. Ent.*, 35: 51-53, 1903; Bethune, C. J. S., *P.*, *Can. Ent.*, 49: 37-39, 1917.
- REED, Edwyn Carlos. (1841-1910). "J. L." *B.*, *Rev. Soc. Ent. Arg.*, 11: 288-290, 1942; Porter, C. E., *B.*, *P.*, *Rev. Chilena Hist. Nat.* 15: 18-21, 1911; Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930.
- REED, Walter C. (1851-1902). Stiles, C. W., et al., *Proc. Ent. Soc. Wash.*, 5: 157-158, 1903; McCaw, W. D., *P.*, *Smithsn. Rpt.* 1905, pp. 549-556, 1906; Sternberg, G. M., *Proc. Wash. Acad. Sci.*, 5: 407-409, 1903; McCaw, W. D., *Pop. Sci. Mo.*, 65: 262-268, 1904; Kelly, H. A., *B.*, *P.*, Walter Reed and Yellow Fever, 3rd ed., 355 pp. 1923; Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930.
- RÉGIMBART, Maurice Auguste. (1852-1907). Lesne, P., *Bull. Soc. Ent. France*, p. 229, 1907; Horn, W., *Deutsche Ent. Ztschr.*, p. 158, 1908; *A.*, *Wien. Ent. Zeit.*, 27: 58, 1908; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 265-266, 1932; Zaitzev, P., *Rev. Russe Ent.*, 7: 174-175, 1907; Zaitzev, P., *B.* only, *Rev. Russe Ent.*, 12: 371-375, 1912.
- REH, Ludwig. (1867-1940). *A.*, *Zool. Anzeiger*, 132: 195, 1940.
- REICHE, Louis Jerome. (1799-1890). *A.*, *Ent. Mo. Mag.*, 26: 163, 1890; Brisout de Barneville, C., *P.*, *Ann. Soc. Ent. France*, (6) 10: 559-562, 1890; "F.", *Krancher's Ent. Jahrb.*, p. 196, 1892; Musgrave, A., *Bib. Austr. Ent.*, p. 266, 1932; Essig, E. O., *P.*, *Hist. of Ent.*, p. 738, 1931.
- REICHENBACH, Heinrich Gottlieb Ludwig. (1793-1879). Carus, J. V., *Zool. Anzeiger*, 2: 192, 1879; Müller, K., *Natur*, n. s., 5: 230-231, 1879; Reichenow, A., *Ornith. Centralbl.* 4: 56, 1879; *A.*, *Ibis*, (4) 3: 384, 1879; *A.*, *Amer. Journ. Sci.*, 19: 77, 1880; Friedrich, E., *Sitzb. Isis (Dresden)*, 1879, pp. 97-105, 1880; *A.*, *Ber. Senckenb. Nat. Ges.*, p. 6, 1878-79; *A.*, *B.*, *Leopoldina*, 17: 19-22, 34-36, 50-54, 1881.
- REICHERT, Alexander. (1859-1939). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 6: 349, 1939; Sachtleben, H., *Arb. phys. angew. Ent. Berlin-Dahlem*, 6: 316, 1939; Michalk, O., *B.*, *Ent. Ztschr. Frankfurt*, 53: 325-331, 1940; Emden, F. von, et al., *B.*, *P.*, *Ztschr. Wiss. Insektenbiol.*, 24: 1-10, 1929.
- REIMOSER, Eduard. (1864-1940). Sachtleben, H., *Arb. morph. taxon. Ent. Berlin-Dahlem*, 7: 76, 1940; *A.*, *Zool. Anzeiger*, 129: 224, 1940.
- REINECKE, Georg. (1882-1937). *A.*, *Arb. morph. taxon. Ent.*, 4: 160, 1937; *A.*, *Kol. eopt. Rundschau*, 23: 116, 1937.
- REINECKE, Ottomar. (1840-1917). *A.*, *Ent. News*, 29: 240, 1918.
- REINHARDT, Johann Christopher Hagemann. (1777-1845). Henriksen, K. L., *Ent. Meddel.*, 15: 141-144, 1923.
- REINHARDT, Johannes Theodor. (1816-1882). *A.*, *Zool. Anzeiger*, 5: 644, 1882; *A.*, *Amer. Nat.*, 17: 116, 1883; Henriksen, K. L., *P.*, *Ent. Meddel.*, 15: 213-214, 1926; *A.*, *Leopoldina*, 18: 209, 1882.
- REINICKE, William Rhodes. (1879-1929). *A.*, *Ent. News*, 40: 134, 1929.
- REITTER, Edmund. (1845-1920). *A.*, *Ent. Mo. Mag.*, 56: 113, 1920; *A.*, *Ent. News*, 31: 210, 1920; Heikertinger, F., *Verh. Zool.-Bot. Ges. Wien*, 70: (105)-(107), 1920 (1921); Navas, L., *P.*, *Bol. Soc. Ent. Espana*, 4: 44-46, 1921; Wanka, T. von, *B.*, *P.*, *Wien. Ent. Zeit.*, 34: 215-287, 1915; Heikertinger, F., *B.*, *P.*, *Wien. Ent. Zeit.*, 38: 1-20, 1920; Rothschild, L. W., *Trans. Ent. Soc. Lond.*, (Proc.), p. cxxx, 1921; Hedwig, K., *Jahresh. Ver. Insekten.*, Breslau, 13: 21-23, 1921; Musgrave, A., *Bib. Austr. Ent.*, pp. 266-267, 1932; Meissner, O., *P.*, *Ent. Ztschr. Frankfurt*, 43: 1-2, 1929; Formánek, R., *P.*, *Ent. Blätter*, 4: 1-3, 1908; *A.*, *Acta Mus. Dzieduszyckini (Lwow)*, 5-6: 236, 1919-20.
- RENDSCHMIDT, Felix. (1786-1853). *A.*, *Arb. Schles. Ges. Vaterl. Kultur*, pp. 185-186, 1853.
- RENGGER, Johann Rudolph. (1795-1832). *A.*, *Ann. Soc. Ent. France*, 1: 332, 1832.
- RENNIE, James. (1787-1868). *A.*, *Ent. Mo. Mag.*, 4: 191, 1867-68.
- REPPERT, Roy R. (1881-1940). Bilsing, S. W., *P.*, *Journ. Econ. Ent.*, 33: 707, 1940.
- RETZIUS, Andreas Johann. (1742-1821). Strecker, H., *B.*, *Butterflies and moths of N. A.*, pp. 262-263, 1878.
- REUSS, Adolf. (1804-1879). *A.*, *Ber. Senckenb. Ges.*, p. 7, 1878-79.
- REUTER, Odo Morannal. (1850-1913). *A.*, *Ent. News*, 25: 48, 1914; "E. B.", *P.*,

- Ent. Mo. Mag., 49: 230-231, 1913; Heidemann, O., B., Proc. Ent. Soc. Wash., 16: 76-78, 1914; Sahlberg, J., P., Ent. Tidskr. (Uppsala), 38: 62-96, 1917; Joannis, J. de, Bull. Soc. Ent. France, p. 357, 1913; Musgrave, A., B., Bib. Austr. Ent., pp. 267-268, 1932; Oshanin, B., P., Rev. Russe Ent., 13 (3-4): i-viii, 1913; Palmén, J. A., B., P., Acta Soc. Sci. Fenn., 45: 1-44, 1914.
- REUTTI, Carl. (1830-1894). Hering, E., Stett. Ent. Zeit., 55: 305-307, 1894; A., Leopoldina, 31: 58, 1895.
- REVERDIN, Jacques Louis. (1842-1929). Muschamp, P. A. H., Ent. Record, 41: 68, 1929; Hemming, A. F., B., Entomologist, 62: 93-96, 1929; A., Proc. Ent. Soc. Lond., 4: 130, 1930; Marié, P., Bull. Soc. Ent. France, pp. 29-30, 1929.
- REY, Claudius. (1817-1895). Guillebeau, F., Échange, 11: 13-15, 1895; Kraatz, G., Deutsche Ent. Ztschr., 39: 7-8, 1895; Guillebeau, F., P., Ann. Soc. Ent. France, 64: 127-130, 1895.
- REYNOLDS, Lawrence R. (1878-1922). Frentz, E. W., et al., P., Sherman, Mt. Vernon, N. Y., 6 pp., 1924; A., Science, 56: 475, 1922.
- RHUMBLER, Ludwig. (1864-1939). Escherich, K., P., Ztschr. Angew. Ent., 26: 682-683, 1940.
- RIBBE, Carl. (1860-1934). A., Arb. morph. taxon. Ent. Berlin-Dahlem, 1: 309, 1934; "K. M. H.", P., Ent. Rundschau, 51: 229-231, 1934; A., Koleopt. Rundschau, 21: 57, 1935.
- RIBEIRO, Alipio Mirando. (1874-1939). A., Rev. Ent. (Rio de J.), 10: 483, 1939; A., B., P., Bol. Biol. (S. Paulo), n. s., 4: 153-159, 1939.
- RICHTER, P. (1841-1891). Honrath, E. G., B., Berlin. Ent. Ztschr., 36: 472-473, 1891.
- RICKETTS, Howard Taylor. (1871-1910). Howard, L. O., P., Hist. of Applied Ent., 1930.
- RICKSECKER, Lucius Edgar. (1841-1913). A., Ent. News, 24: 144, 1913; Fall, H. C., Ent. News, 24: 239-240, 1913; Essig, E. O., P., Hist. of Ent., pp. 738-741, 1931.
- RIDDELL, Janet. ( - ). Blair, K. G., Proc. Roy. Ent. Soc. Lond., (C) 6: 41, 1941-42.
- RIDINGS, James. (1803-1880). A., P., Ent. News, 7: 161-162, 1896; Cresson, E. T., Trans. Amer. Ent. Soc., 8: xv, 1880.
- RIDINGS, James H. (1842-1908). A., Ent. News, 19: 242, 1908.
- RIEDEL, Max. (1862-1937). A., Arb. morph. taxon. Ent. Berlin-Dahlem, 5: 72, 1938.
- RIEDEL, M. P. (1870-1941). Alexander, C. P., Rev. Ent. (Rio de J.), 12: 417, 1941; Alexander, C. P., Ent. News, 52: 268, 1941; A., Mitt. Deutsch. Ent. Ges., 10: 53, 1941.
- RIEHL, Friedrich. (1795-1876). Dohrn, C. A., Stett. Ent. Zeit., 37: 189, 1876; Kraatz, G., Deutsche Ent. Ztschr., 20: 206, 1876.
- RIEM, Johann. (1730-1807). Staudmeister, J. C., et al., Neuer Sächs. Bienenmeister, 2: 149-153, 1808.
- RIFFARTH, Heinrich H. (1860-1908). Horn, W., P., Deutsch. Ent. Ztschr., pp. 426-427, 1908; A., P., Ent. Wochenbl., 25: 57, 1908.
- RILEY, Charles Frederick Curtis. (1872-1933). Hungerford, H. B., Ann. Ent. Soc. Amer., 27: 123, 1934; Osborn, H., Fragments Ent. Hist., p. 228, 1937; A., Entomologist, 66: 263, 1933.
- RILEY, Charles Valentine. (1843-1895). A., Can. Ent., 26: 174-175, 1894; A., P., Ent. News, 6: 241-243, 1895; A., Ent. Record, 7: 72, 1895; A., P., Nat. Cyclop. Amer. Biog., 9: 443-444, 1907; A., Psyche, 7: 308, 1895; Goode, G. B., Science, n. s., 3: 217-225, 1896; Howard, L. O., Bull. Phil. Soc. Wash., 13: 412-416, 1895; Howard, L. O., et al., P., Proc. Ent. Soc. Wash., 3: 293-298, 1896; Fletcher, J., P., Can. Ent., 27: 273-274, 1895; McLachlan, R., Ent. Mo. Mag., 31: 269-270, 1895; Meldola, R., et al., Trans. Ent. Soc. Lond., (Proc.), pp. xxvi-xxx, lxxviii-lxix, 1895; Packard, A. S., P., Ann. Rpt. Ent. Soc. Ont., 26: 95-100, 1895; Packard, A. S., Science, n. s., 2: 745-751, 1895; Smith, J. B., P., Pop. Sci. Mo., 76: 476-477, 1910; Starr, F., P., Pop. Sci. Mo., 52: 640-641, 1898; Strecker, H., B., Butterflies and moths of N. A., pp. 263-264, 1878; Walton, W. R., Proc. Ent. Soc. Wash., 23: 92-93, 1921; Mayet, V., B., P., Ann. Soc. Ent. France, 65: 630-640, 1896; Wade, J. S., Proc. Ent. Soc. Wash., 38: 131,

- 1936; Howard, L. O., Ann. Rpt. Smithsn. Inst., pp. 388-391, 1930; *A., P.*, Colman's Rural World, St. Louis Mo., May 12, 1892; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Essig, E. O., *P.*, Hist. of Ent., pp. 741-745, 1931; Osborn, H., *P.*, Fragments Ent. Hist., pp. 151-157, 1937.
- RIS, Friedrich. (1867-1931). Calvert, P. P., *P.*, Ent. News, 42: 181-191, 1931; Schulthess, A. von, *P.*, Mitt. Schweiz. Ent. Ges., 15: 65-66, 1931; Davis, J. J., Ann. Ent. Soc. Amer., 25: 251, 1932; Musgrave, A., Bib. Austr. Ent., p. 269, 1932; Navas, P., Bol. Soc. Ent. Espan., 14: 47-48, 1931.
- RITCHIE, A. S. ( -1870). *A.*, Can. Ent., 2: 155-156, 1870; *A., B.*, Can. Ent., 3: 177, 1871.
- RITCHIE, Archibald Hamilton. (1887-1936). Laing, F., Ent. Mo. Mag., 72: 120, 1936; Horn, W., Arb. phys. angew. Ent. Berlin-Dahlem, 3: 301, 1936; Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- RIVERS, James. (1824-1913). Grinnell, F., Jr., Bull. Bklyn. Ent. Soc., 9: 72-73, 1914; Grinnell, F., Jr., Ent. News, 25: 143-144, 1914; Essig, E. O., *P.*, Hist. of Ent., pp. 746-747, 1931.
- RIVINUS, Augustus Quirinus. (1652-1723). Nordenskiöld, Erik, Hist. of Biol., p. 195, 1935.
- ROBBINS, John Cuthbert. (1906-1932). Sheldon, W. G., Entomologist, 65: 144, 1932; *A.*, Ent. Record, 44: 78, 1932.
- ROBERT, Charles. (1802-1837). Lacordaire, J. T., Ann. Soc. Ent. France, 6, (Bull.): xxxi-xxxiii, 1837.
- ROBERTSON, Charles. (1858-1935). *A.*, Ent. News, 47: 228, 1936; Parks, H. B., *B.*, *P.*, Bios, 7: 85-96, 1936; Osborn, H., *P.*, Fragments Ent. Hist., p. 184, 1937.
- ROBERTSON, R. Bowen. (1860-1919). Lucas, W. J., Entomologist, 53: 96, 1920.
- ROBIN, Charles. (1821-1885). Laboulbène, A., *B.*, Ann. Soc. Ent. France, (6) 5: 467-472, 1885 (1886).
- ROBINEAU-DESVOIDY, André Jean Baptiste. (1799-1857). Bigot, J., *B.*, Ann. Soc. Ent. France, (3) 5, (Bull.): cxxxii-cxxxv, 1857; Osten Sacken, C. R., Berl. Ent. Ztschr., 38: 383-386, 1893; Osten Sacken, C. R., Record of my life and work in entomology, pp. 180-192, 1903; Musgrave, A., Bib. Austr. Ent., p. 270, 1932.
- ROBINET, Stephan. (1796-1869). *A.*, Oesterr. Seidenbau-Zeit., 2: 4, 1870.
- ROBINSON, Coleman Townsend. (1838-1872). "H. S.", *P.*, Ent. News, 36: 309, 1925; Grote, A. R., *B.*, Can. Ent., 4: 109-111, 1872; *A.*, Ent. Mo. Mag., 9: 96, 1872; Westwood, J. O., Trans. Ent. Soc. Lond., (Proc.): li, 1872.
- ROBINSON, Wirt. (1864-1929). Calvert, P. P., Ent. News, 40: 168, 1929.
- ROBOROVSKY, Vsevolod Ivanovich. (1856-1910). Semenov-Tian-Shansky, A., Rev. Russe Ent., 10: 247-248, 1910.
- ROBSON, John Emmerson. (1833-1907). Waterhouse, C. O., Trans. Ent. Soc. Lond. (Proc.), pp. xcv-xcvi, 1907; *A.*, Leopoldina, 43: 55, 1907.
- RODRIGUEZ LUNA, Juan J. (1840-1916). *A.*, Ent. News, 28: 335-337, 1917; Champion, G. C., Ent. Mo. Mag., 53: 68, 1917; *A.*, Science, 45, 112, 1917.
- ROEDER, Victor von. ( -1910). *A.*, Wien. Ent. Zeit., 30: 80, 1911; Kuhn, P., Deutsche Ent. Ztschr., p. 234, 1911; Musgrave, A., *B.*, Bib. Austr. Ent., p. 270, 1932.
- ROELOFS, Willem. ( -1897). Kerremans, C., Ann. Soc. Ent. Belg., 41: 163, 1897; *A.*, Ent. Mo. Mag., 33: 186, 1897; Leesberg, A. F. A., Tidschr. Ent., 40, (Verslag): 32, 1897; Musgrave, A., *B.*, Bib. Austr. Ent., p. 271, 1932.
- ROEMER, Johann Jacob. (1761-1819). Hagen, H. A., Bib. Ent., 2: 83, 1863; Schinz, H. R., *B.*, Meisner's Naturw. Anzeiger, 2: 89-94, 1819; Musgrave, A., Bib. Austr. Ent., p. 271, 1932.
- ROESCHKE, Hans. (1867-1934). *A.*, Koleopt. Rundschau, 21: 57, 1935.
- ROESEL VON ROSENHOF, August Johann. (1705-1759). Miall, L. C., Early naturalists, their lives and work, pp. 293-303, 1912; Nordenskiöld, Erik, Hist. of Biol., p. 233, 1935; Locy, W. A., *P.*, Story of Biol., pp. 266-268, 1925; Kleeman, C. F. C., *P.*, Roessel & Kleeman's Insecten Belustigung, 4: 1-48, 1761; Howard, L. O., *P.*, Hist. Applied Ent., 1930.
- ROESSLER, Adolf. (1814-1885). Pagenstecher, A., *B.*, Stett. Ent. Zeit., 47: 19-22, 1886; Pagenstecher, A., *B.*, Jahrb. Nassau. Ver. Naturk., 38: 149-152, 1885.



- ROESSLERSTAMM, Josef Emanuel Fischer. (1787-1866). Frauenfeld, G. R., von, Verh. Zool.-Bot. Ges. Wien, 16, (Sitzb.): 51-54, 1866.
- ROGENHOFFER, Alois Friedrich. (1832-1897). *A.*, Ent. Mo. Mag., 33: 108, 1897; *A.*, Ent. News, 8: 120, 1897; Mik, J., et al., Wien. Ent. Zeit., 16: 44, 1897; Feindachner, F. S., Ann. Nat. Hofmus. Wien, 13, (Jahresb 1897): 2, 1898; Trimen, R., Trans. Ent. Soc. Lond., (Proc.), p. lxxiv, 1897; Musgrave, A., Bib. Austr. Ent., p. 271, 1932.
- ROGER, Julius. ( -1865). Kraatz, G., *P.*, Berlin. Ent. Ztschr., 9: I, 1865.
- ROJAS, Marco Aurelio de. (1831-1866). Sallé, A., Ann. Soc. Ent. France, (4) 6: 600-602, 1866.
- ROLANDO, Luigi. (1773-1831). Bellingeri, C. F., Mem. R. Accad. Sci. Torino, 37: 153-193, 1832.
- ROLL, Hermanus Frederik. (1867-1935). Olivier, Med. Dienst Volksgezondh. Ned.-Indië, 24: unpagd, 1935.
- ROLLASON, William Alfred. (1863-1911). Wheeler, G., Ent. Record, 23: 232, 1911; *A.*, Ent. Mo. Mag., 47: 141, 1911; Morice, F. D., Trans. Ent. Soc. (Proc.): cxxii-cxxiii, 1911.
- RONDANI, Camillo. (1807-1879). Meade, R. H., Ent. Mo. Mag., 16: 138-139, 1879; *A.*, Zool. Anzeiger, 2: 600, 1879; *A.*, Naturaliste, 1: 143, 1879; Fitch, E. A., Entomologist, 13: 120, 1880; Osten-Sacken, C. R., *B.*, Bull. Soc. Ent. Ital., 17: 149-162, 1885; Bezzi, M., *P.*, Boll. Mus. Zool. & Anat. Comp. Torino, 23 (592): 1-10, 1908; Lessona, M., *B.*, Ann. Accad. Agr. Torino, 23: 129-153, 1881; Osten-Sacken, C. R., Record of my life and work in entomology, pp. 144-153, 1903; *A.*, *B.* only, Bull. Soc. Ent. Ital., 2: 297-300, 1870; Musgrave, A., Bib. Austr. Ent., p. 272, 1932; Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- RONDELET, Guillaume. (1507-1566). Locy, W. A., *P.*, Story of Biol., pp. 287-288, 1925.
- ROOS, Karl. (1908-1942). Schneider-Orelli, O., *B.*, *P.*, Mitt. Schweiz. Ent. Ges., 18: 530-531, 1943.
- ROOT, Francis Metcalf. (1889-1934). Calvert, P. P., *B.*, Ent. News, 45: 285-286, 1934; Hungerford, H. B., Ann. Ent. Soc. Amer., 29: 185, 1936.
- ROOT, George A., (1890-1942). Bellis, C. E., et al., Journ. Econ. Ent., 35: 953, 1942.
- ROOY, Alexander Benjamin van Medenbach de. (1841-1878). Kraatz, G., Deutsche Ent. Ztschr., 22: 226, 1878; *A.*, Tijdschr. Ent., 22: iii, 1878.
- ROOY, Henricus Cornelius van Medenbach de. (1794-1877). *A.*, Tijdschr. Ent., 22: ii, 1878.
- ROQUES, Xavier. (1882-1915). Berland, S., *P.*, Ann. Soc. Ent. France, 89: 430-432, 1920.
- ROSENFELD, Arthur Hinton. (1866-1942). Wolcott, G. N., Journ. Econ. Ent., 36: 358, 1943; *A.*, Ann. Ent. Soc. Amer., 37: 136, 1944.
- ROSENHAUER, Wilhelm Gottlob. (1813-1881). Dohrn, C. A., Stett. Ent. Zeit., 42: 488, 1881; Kraatz, G., Deutsche Ent. Ztschr., 25: 342-343, 1881; Katter, F., Ent. Nachr., 7: 231-232, 1881; *A.*, Leopoldina, 17: 157, 1881.
- ROSS, Ronald. (1857-1932). *A.*, Ent. News, 43: 252, 1932; Bonne, C., Geneesk. Tijdschr. Nederl.-Indië, 72: 1330, 1932; Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- ROSS, Terry Spinks. (1903-1928). Plank, H. K., Journ. Econ. Ent., 21: 440, 1928.
- ROUSSEAU, Ernest. (1872-1920). Lestage, J. A., *B.*, *P.*, Bull. Soc. Ent. Belg., 3: 35-41, 1921.
- ROSSI, Pietro. ( - ). Swainson, W., Bib. of Zool., p. 311, 1840.
- ROSSMÄSSLER, Emil Adolf. (1806-1867). *A.*, Zool. Garten, 8: 199-200, 1867; Schmidt, A., Malakozool. Blätter, 14: 183-190, 1867; Ule, O., *P.*, Die Natur, 16: 188-190, 193-195, 217-220, 1867; Ule, O., *I. c.*, 19: 220-223, 1870.
- ROSTAGNO, Fortunato. (1847-1934). Turati, E., Boll. Soc. Ent. Ital., 66: 182, 1934.
- ROSTRUP, Sofie. (1857-1940). Bovien, P., *P.*, Ent. Meddel. (Copenhagen), 20: 593-596, 1940; Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- ROTH, Henry Ling. (1855-1925). Haddon, A. C., Nature, 115: 844, 1925; Musgrave, A., Bib. Austr. Ent., p. 272, 1932.

- ROTHENBACH, Johann Christian. (1796-1881). Jäggi, F., *P.*, Mitt. Schweiz. Ent. Ges., 6: 243-250, 1881.
- ROTHNEY, George Alexander James. (1849-1922). Poulton, E. B., Ent. Mo. Mag., 58: 113-114, 1922; *A.*, Ent. News, 33: 255, 1922; Rothschild, L. W., Trans. Ent. Soc. Lond., (Proc.), p. cxxi, 1922.
- ROTHSCHILD, Lionel Walter. (1868-1937). Walker, J. J., Ent. Mo. Mag., 73: 236-237, 1937; Riley, N. D., *P.*, Entomologist, 70: 217-220, 1937; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 241, 1937; Turner, H. J., Ent. Record, 49: 149-150, 1937; Jordan, K., *B.*, *P.*, Novitates Zool., 41: 1-41, 1938; Imms, A. D., Proc. Roy. Ent. Soc. Lond., (C) 2: 62, 1937; Hinton, M. A. C., Proc. Linn. Soc. Lond., pp. 334-337, 1937-38; Zimmerman, E. C., Proc. Haw. Ent. Soc., 10: 19, 1938; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 272-273, 1932; Frennet, L., Bull. & Ann. Soc. Ent. Belg., 77: 325, 1937; "L. R. N.," Norsk Ent. Tidsskrift, 5: 43, 1938.
- ROTHSCHILD, Nathaniel Charles. (1877-1923). Austen, E. E., Nature, 112: 697, 1923; Skinner, H., Ent. News, 35: 76, 1924; "B. D. J.," Proc. Linn. Soc. Lond., pp. 57-58, 1923-24; Walker, J. J., Ent. Mo. Mag., 59: 279-280, 1923; Frowhawk, F. W., Entomologist, 56: 284-286, 1923; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 273-274, 1932.
- ROTTENBERG, Arthur von. (1843-1875). Kraatz, G., Deutsche Ent. Ztschr., 19: 437-438, 1875; Kiesenwetter, H. von, *B.*, l. c., 439-440, 1875.
- ROUSSEAU, Ernest. (1872-1920). Lestage, J. A., *B.*, *P.*, Bull. Soc. Ent. Belg., 3: 35-41, 1921.
- ROUTLEDGE, George Bell. (1864-1934). "F. D. H.," Ent. Record, 47: 11-12, 1935; Adkin, R., Entomologist, 68: 24, 1935; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 2: 309, 1935.
- ROUX, Jean Louis Florent Polydore. (1792-1833). Barthelemy, L. A., Ann. Soc. Ent. France, 3, (Bull.): xlv-li, 1834.
- ROUX, Wouter Kirstein. (1906-1941). Favre, J. C., Journ. Ent. Soc. So. Afr., 4: 240, 1941.
- ROUZET, Jean Hippolyte. (1802-1865). Desmarest, E., Ann. Soc. Ent. France, (4) 6: 135-137, 1866.
- ROWLAND-BROWN, Henry. (1865-1922). *A.*, Ent. News, 33: 256, 1922; Sheldon, W. G., *P.*, Entomologist, 55: 121-123, 1922; Bethune-Baker, G. T., *P.*, Ent. Record, 34: 119-120, 1922; Turner, H. J., *P.*, Amateur de Papillons, 1: 149-152, 1923; Walker, J. J., Ent. Mo. Mag., 58: 165-166, 1922; Rothschild, L. W., Trans. Ent. Soc. Lond., (Proc.), p. cxx, 1922; Oberthür, C., Ann. Soc. Ent. France, 91: 336, 1922; Oberthür, C., *P.*, Études Léop. Comp., 10 (Plates), unpagged, 1915.
- RÜBSAAMEN, Ewald Heinrich. ( -1919). Hedicke, H., Deutsche Ent. Ztschr., p. 233, 1919; Musgrave, A., *B.*, Bib. Austr. Ent., p. 274, 1932.
- RUDBECK, Olaus. (1660-1740). Fée, A. L. A., Mem. Soc. Sci. Lille, 1: 85-86, 1831 (1832).
- RUDOLPHI, Carl Asmund. (1771-1832). Nordenskiöld, Erik, Hiist. of Biol., pp. 352-355, 1935.
- RUFFIN, Edmond. (1794-1865). Howard, L. O., *P.*, Hist. Applied Ent., 1930.
- RÜHL, Fritz. (1836-1893). *A.*, Ent. News, 4: 280, 1893; *A.*, Societas Ent., 8: 49, 1893; Rühl, M., l. c., 8: 65, 1893; Mik, J., et al., Wien. Ent. Zeit., 12: 288, 1893.
- RUIZ, Hermano Flamino. (1884-1942). Porter, C. E., *B.*, *P.*, Rev. Chilena Hist. Nat., 39: 174-178, 1935; Cortes, R., Rev. Ent. (Rio de J.), 14: 324-325, 1943.
- RUMPHIUS, Georg Eberhard. (1627-1702). Leupe, P. A., Verh. Akad. Wetensch. Amsterdam, 12: 63 pp., 1871.
- RUMSEY, William Earl. (1865-1938). Peiers, L. M., *P.*, Journ. Econ. Ent., 31: 463, 1938; Osborn, H., Fragments Ent. Hist., p. 200, 1937.
- RUNNER, George A. (1876-1941). Porter, B. A., Journ. Econ. Ent., 34: 592, 1941.
- RUPERTSBERGER, Matthias. (1843-1931). *A.*, Koleopt. Rundschau, 18: 216, 1932, Heikertinger, F., *P.*, Koleopt. Rundschau, 19: 79-80, 1933.
- RUSCHWEYH, George. (1826-1899). Dyar, H. G., Ent. News, 11: 580, 1900.
- RUSSELL, John Anthony. ( -1942). *A.*, Entomologist, 75: 72, 1942.

- RUSSELL, Frederick William. (1844-1915). Hall, F. J., *Ent. News*, 27: 47-48, 1916; *A., Psyche*, 23: 1916.
- RUSSELL, Harry Merwin. (1882-1915). Quaintance, A. L., et al., *B., Proc. Ent. Soc. Wash.*, 18: 3-5, 1916; Britton, W. E., *Journ. Econ. Ent.*, 8: 433, 1915.
- RUSTON, Alfred Harold. (1856-1929). Fryer, J. C. F., *Entomologist*, 63: 24, 1930.
- RUZSKII, Mikhail Dmitrievich. (1864-1936). Berezhkov, R. Ф., *P., Trav. Inst. Sci. Biol. Tomsk*, 4: 1-6, 1937.
- RYBINSKI, Michael. (1846-1905). A., *Wien. Ent. Zeit.*, 24: 118, 1905.
- RYE, Bertram George. (1872-1936). Wolff, N. L., *P., Ent. Meddel.*, 20: 103-105, 1938.
- RYE, Edward Caldwell. (1832-1885). A., *Ent. Mo. Mag.*, 21: 238-240, 1885; Car-  
rington, J. T., *Entomologist*, 18: 79-80, 1885; Dimmock, C., *Psyche*, 4: 266, 1885;  
McLachlan, R., *Trans. Ent. Soc. Lond.*, (Proc.), pp. xli-xlii, 1885.
- SAALMÜLLER, Max. (1832-1890). Honrath, E. G., *Berl. Ent. Ztschr.*, 36: 468-471, 1891; "F.", *Krancher's Ent. Jahrb.*, p. 197, 1892; A., *Wien. Ent. Zeit.*, 9: 272, 1890.
- SACHSE, Carl Traugott. (1815-1863). Reichenbach, H. G. L., *Sitzb., Naturw. Ges. Isis*, (Dresden), pp. 1-6, 1864.
- SAHLBERG, Carl Reinhold. (1779-1860). Sanmark, F. G., *B., Sällsk. Faun. Flora Fenn.*, pp. 160-167, 1861; Toruroth, L. H., *Acta Soc. Sci. Fenn.*, 6: 1-7, 1861.
- SAHLBERG, John Reinhold. (1846-1920). A., *Ent. Mo. Mag.*, 56: 138, 1920; A., *Ent. News*, 31: 239, 1920; Böving, A. G., *B., Science*, n. s., 52: 216-217, 1920; A., *P., Notulae Ent.*, 1: 21-25, 1921.
- SAILER, Max. ( -1909). A., *Mitt. Münch. Ent. Ges.*, 1: 8, 1910.
- SAINT CYR, Dominique Napoleon. (1825-1899). Treffny, J. E., *Can. Ent.*, 31: 102, 1899.
- SALIS-MARSCHLINS, Carl Ulysses. (1762-1818). A., *Meisner's Naturw. Anzeiger*, 1: 72, 1818.
- SALLÉ, Auguste. (1820-1896). Horn, G. H., *Ent. News*, 7: 192, 1896; Meldola, R., *Trans. Ent. Soc. Lond.*, (Proc.), pp. xciii-xciv, 1896; Giard, A., *Bull. Soc. Ent. France*, p. 213, 1896; A., *Ent. Mo. Mag.*, 32: 141, 1896; A., *Leopoldina*, 32: 139, 1896.
- SALMON, Daniel Elmer. (1850-1914?). A., *Ent. News*, 26: 96, 1915.
- SALVAGE, Thomas. (1850-1926). A., *Entomologist*, 59: 176, 1926.
- SALVIN, Osbert. (1835-1898). A., *Entomologist*, 31: 175-176, 1898; A., *P., Ent. News*, 27: 193-197, 1916; *Autobiography*, *P., Jubilee Suppl. to Ibis*, 2: 127-128, 1909; Godman, F. D., *Biol. Centrali-Amer.*, 1: 1-12, 1915; McLachlan, R., *Ent. Mo. Mag.*, 34: 164-165, 1898; Trimen, R., *Trans. Ent. Soc. Lond.*, (Proc.), pp. lii-liii, 1898; A., *Cent. Hist. Ent. Soc. Lond.*, pp. 153-154, 1933; A., *Deutsche Ent. Ztschr.*, 42: 8, 1898; Osborn, H., *Fragments Ent. Hist.*, p. 173, 1937.
- SAMPSON, F. Winn. (1853-1926). A., *Ent. Mo. Mag.*, 63: 16, 1927; Poulton, E. B., *Proc. Ent. Soc. Lond.*, 1: 77, 1926.
- SANBORN, Francis Gregory. (1838-1884). A., *Psyche*, 4: 175, 1884; Mann, B. P., *I. c.*, 4: 205, 1884; "T. A. D.", *Can. Ent.*, 16: 103-105, 1884; Dickinson, T. A., *P., Proc. Worcester Soc. Antiquity*, 1884, 20 pp., 1885; Howard, L. O., *P., Hist. Applied Ent.*, 1930.
- SANDER, Heinrich. (1754-1782). Roemer, J. J., *Fuessley's Neues Mag. Ent.*, 2: 81-86, 1785.
- SANDERS, George Ethelbert. (1884-1943). Davis, J. J., *P., Journ. Econ. Ent.*, 36: 811-812, 1943.
- SANDHOUSE, Grace Adelbert. (1896-1940). Cushman, R. A., et al., *B., P., Proc. Ent. Soc. Wash.*, 42: 187-189, 1940; A., *Ent. News*, 52: 30, 1940; Muesebeck, C. F. W., *Ann. Ent. Soc. Amer.*, 41: 262-263, 1941; Usinger, R. L., *Pan-Pacific Ent.*, 17: 84, 1941; A., *Rev. Ent. (Rio de J.)*, 12: 416, 1941.
- SANG, John. (1828-1887). A., *Ent. Mo. Mag.*, 23: 261, 278-279, 1887; Robson, J. E., *Naturalist*, 151: 52-54, 1888.
- SANGSTER, John Herbert. (1831-1904). A., *Can. Ent.*, 36: 72, 1904.

- SANTSCHI, Felix. (1872-1940). Kutter, H., Mitt. Schweiz. Ent. Ges., 18: 286-289, 1941; *A.*, Ent. Record, 53: 56, 1941; Donisthorpe, H., Ent. Record, 53: 99-100, 1941.
- SASAKI, Chiujiho. (1857-1938). Ishimori, N., *B.*, *P.*, Kontyu, 12: 115-120, 1938; Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- SATUNIN, Konstantin Alekseyevich. ( -1915). Semenov-Tian-Shanskij, A. P., *B.*, *P.*, Rev. Russe Ent., 15: 677-681, 1915.
- SAUBER, Amandus. (1846-1917). Hasebrook, K., *P.*, Internat. Ent. Ztschr., 11: 41-45, 1917; "v. Br.", Deutsche Ent. Ztschr., pp. 180-181, 1917.
- SAULCY, Felicien Henry Caignart de. ( -1912). Kheil, N. M., Internat. Ent. Ztschr., 5: 243-245, 1911.
- SAULCY, Louis Félix Joseph Caignart de. (1807-1880). Reiche, M. L., Ann. Soc. Ent. France, (5) 10: 413-416, 1880; *A.*, Zool. Anzeiger, 4: 364, 1881; *A.*, Ent. Nachr., 7: 232, 1881.
- SAUNDERS, Charles James. (1868-1941). Blair, K. G., Ent. Mo. Mag., 77: 209, 1941.
- SAUNDERS, Edward. (1848-1910). "M". *P.*, Ent. Mo. Mag., 46: 49-53, 1910; Oshanin, B., Rev. Russe Ent., 10: 122, 1910; Poulton, E. B., *P.*, Proc. Roy. Soc. Lond., (B) 91: xii-xvii, 1920; Waterhouse, C. O., Zoologist, (4) 14: 77-78, 1910; Musgrave, A., *B.*, Bib. Austr. Ent., p. 275, 1932; Stebbing, T. R., Proc. Linn. Soc. Lond., pp. 94-98, 1910.
- SAUNDERS, Sidney Smith. (1809-1884). Dunning, J. W., *B.*, Trans. Ent. Soc. Lond., (Proc.), pp. xi-xlii, 1884; *A.*, *B.*, Ent. Mo. Mag., 20: 278-279, 1884; Lefèvre, E., Ann. Soc. Ent. France, (6) 4, (Bull.): lxiii-lxiv, 1884; Musgrave, A., Bib. Austr. Ent., p. 275, 1932; Fitch, E. A., Entomologist, 17: 117-119, 1884.
- SAUNDERS, William. (1835-1914). *A.*, *P.*, Can. Ent., 27: 197, 1895; *A.*, Ent. News, 25: 480, 1914; Bethune, C. J. S., et al., Ann. Ent. Soc. Amer., 8: 99, 1915; Bethune, C. J. S., Ann. Rpt. Ent. Soc. Ont., 45: 121-123, 1914; Bethune, C. J. S., *P.*, Can. Ent., 46: 333-336, 1914; Goding, F. W., *P.*, Ann. Rpt. Ent. Soc. Ont., 25: 1, 120-123, 1894; Hewitt, C. G., *P.*, Ann. Rpt. Ent. Soc. Ont., 45: 29, 1914; Strecker, H., *B.*, Butterflies and moths of N. A., pp. 264-266, 1878; Howard, L. O., *P.*, Hist. Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., pp. 164-165, 1937.
- SAUNDERS, William Wilson. (1809-1879). *A.*, Ent. Mo. Mag., 16: 119-120, 1879; Carrington, J. T., Entomologist, 12: 278-280, 1879; *A.*, Amer. Nat., 13: 798, 1879; *A.*, Zool Anzeiger, 2: 576, 1879; *A.*, Naturaliste, 1: 111, 1879; Dunning, J. W., Trans. Ent. Soc. Lond., (Proc.), pp. lxvi-lxvii, 1879; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 275-277, 1932; *A.*, Deutsche Ent. Ztschr., 23: 8, 1879.
- SAUSSURE, Henri Louis Frédéric de. (1829-1905). Bouvier, E. L., Bull. Mus. Paris, 11: 223-225, 1905; Burr, M., Ent. Mo. Mag., 41: 119-120, 1905; Burr, M., *P.*, Ent. Record, 17: 167-170, 1905; Yung, E., *P.*, Arch. Sci. Phys. Genève, 21: 519-534, 1906; Adelung, N. N., *B.*, Horae Soc. Ent. Ross., 38: x-xix, 1907; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 277-278, 1932; Essig, E. O., *B.*, *P.*, Hist. of Ent., pp. 748-750, 1931; Osborn, H., *P.*, Fragments Ent. Hist., 1937.
- SAUTER, Anton Eleutherius. (1800-1881). *A.*, Leopoldina, 17: 156, 1881; Speiser, P., Schrift. physik.-ökon. Ges. Königsberg, 49: 299-301, 1908.
- SAVI, Paolo. (1798-1871). Targioni-Tozzetti, A., Bull. Soc. Ent. Ital., 3: 81-82, 1871; *A.*, Boll. R. Comit. Geol. Ital., 2 (3-4): 90-91, 1871.
- SAVIGNY, Marie Jules César Lelorgne de. (1777-1851). Westwood, J. O., Trans. Ent. Soc. Lond., (2) 1, (Proc.): 136, 1852; Reiche, L., Ann. Soc. Ent. France, (2) 9, (Bull.): ci, 1851.
- SAVILLE, Charles. ( -1930). Mitchell, A. T., Entomologist, 63: 192, 1930.
- SAVILLE-KENT, William. ( -1908). "B. D. J.", Proc. Linn. Soc. Lond., p. 42, 1908-1909; *A.*, Nature, 78: 641-642, 1908.
- SAVIO, Auguste. (1882-1935). Piel, O., Ann. Soc. Ent. France, 105: 6, 1936; Fage, L., Bull. Soc. Ent. France, 41: 8, 1936; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 300, 1936; Piel, O., *P.*, Ent. & Phytopath. (China), 4: 44-46, 1936.
- SAY, Thomas. (1787-1834). *A.*, *P.*, Amer. Journ. Conchology, 1: 1, 1865; *A.*, *B.*, Amer. Journ. Sci., 27: 393-395, 1835; *A.*, Ent. News, 6: 45, 1895; *A.*, Ent. News, 17: 248, 1906; *A.*, Lamb's Biog. Dict. of U. S., 6: 624, 1903; Barber, H. S.,

- Ent. News, 39: 15-20, 1928; Binney, W. G., (ed.), Complete writings of Thomas Say on the Conchology of the U. S. Bailliere, N. Y., pp. 6-252, 1858; Coates, B. H., *B.*, Acad. Nat. Sci. Phila., pp. 1-31, 1835 (unnumbered pamphlet); Coates, B. H., *P.*, Nat. Portrait Gallery, 4 (39): 1-10, 1837; Coates, B. H., *Waldies* Select Circ. Libr., 5: 236-239, 1835; Dall, W. H., *Proc. Biol. Soc. Wash.*, 4: 98-102, 1888; Dow, R. P., *Bull. Bklyn. Ent. Soc.*, 8: 52-54, 72, 1913; Fox, W. J., *Ent. News*, 12: 110-113, 138-141, 173-177, 203-205, 233-236, 281-283, 314-316, 1901; *I. c.*, 13: 9-11, 38-40, 1902; Haguewood, F. K., *Amer. Collector*, 2: 366, 1925; Harris, G. D., *P.*, *Bull. Amer. Paleont.*, 1 (5): 2-84, 271-354, 1896; Harris, T. W., *Psyche*, 8: 399-401, 411-414, 1899; Howard, L. O., *Can. Ent.*, 35: 138-139, 1903; Kingsley, J. S., *P.*, *Pop. Sci. Mo.*, 21: 577, 687-691, 1882; Lockwood, G. B., *New Harmony Communities*, Marion, Ind., 1902; Moore, E. E., *Century of Indiana*, N. Y., 1910; Morris, J. G., *Amer. Journ. Sci.*, 1: 20-24, 1846; Ord, G., *American Entomology by Thomas Say (LeConte ed.)*, pp. 7-22, 1859; Owen, C. D., *Seth Way, A Romance of New Harmony Community*, N. Y., 1917; Schwarz, E. A., *Proc. Ent. Soc. Wash.*, 1: 81-82, 1887; Scudder, S. H., *Psyche*, 6: 57-60, 121-124, 137-141, 169-172, 185-187, 297-298, 345-346, 357-358, 1891; Scudder, S. H., *I. c.*, 8: 306-307, 1899; Smith, J. B., *P.*, *Pop. Sci. Mo.*, 76: 467-468, 1910; Strecker, H., *B.*, *Butterflies and moths of N. A.*, p. 266, 1878; Swainson, W., *B.*, *Bib. of Zool.*, pp. 317-318, 1840; Webster, F. M., *P.*, *Ent. News*, 6: 1-4, 33-34, 80-81, 101-103, 1895; Webster, F. M., *Can. Ent.*, 35: 94, 1903; Weiss, H. B., et al., *Journ. N. Y. Ent. Soc.*, 35: 231-239, 1927; Youmans, W. J., *Pioneers of science in America*, pp. 215-222, 1896; Weiss, H. B. & Ziegler, Grace M., *P.*, *Thomas Say, early American naturalists*, (Baltimore), 260 pp., 1931; Davis, J. J., *P.*, *Proc. Indiana Acad. Sci.*, 41: 43-49, 1932; Weiss, H. B., *Journ. N. Y. Ent. Soc.*, 51: 288-289, 1943; Howard, L. O., *P.*, *Hist. Applied Ent.*, 1930; Osborn, H., *P.*, *Fragments Ent. Hist.*, 1937; Essig, E. O., *P.*, *Hist. of Ent.*, pp. 750-756, 1931.
- SAYCE, Octavius Albert. (1862-1911). "B. D. J.", *Proc. Linn. Soc. Lond.*, pp. 63-64, 1911-12; *A.*, *B.*, *Victorian Nat.*, 28: 25-27, 1911.
- SCHAEFFER, Charles Frederic August. (1860-1934). *A.*, *Science*, 80: 239, 1934; Davis, W. T., *Bull. Bklyn. Ent. Soc.*, 30: 32, 1935; Davis, W. T., *Journ. N. Y. Ent. Soc.*, 43: 248, 1935; *A.*, *Amer. Men of Sci.*, p. 1977, 1933; Davis, W. T., *Journ. N. Y. Ent. Soc.*, 50: 209-210, 1942.
- SCHAEFFER, Jacob Christian. (1718-1790). Strecker, H., *B.*, *Butterflies and moths of N. A.*, p. 266, 1878; Swainson, W., *B.*, *Bib. of Zool.*, pp. 318-319, 1840; Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, pp. 253-254, 1923.
- SCHAUFUSS, Ludwig Wilhelm. (1833-1890). *A.*, *Ent. Mo. Mag.*, 26: 248, 1890; *A.*, *P.*, *Berlin. Ent. Ztschr.*, 36: 213-217, 1891; *A.*, *Insekten-Börse*, 7 (15): 1-2, 1890; *A.*, *Ann. Soc. Ent. France*, (6) 10, (Bull.): cxxxviii, 1890; "F.", *P.*, *Krancher's Ent. Jahrb.*, p. 196, 1892; Reitter, E., *Wien. Ent. Zeit.*, 9: 184, 1890; *A.*, *Leopoldina*, 26: 167, 1890; Musgrave, A., *B.*, *Bib. Austr. Ent.*, p. 279, 1932; Schaufuss, L. W., *B.* only, *Nunquam Otiosus*, 1: 24-26, 1871.
- SCHAUM, Hermann Rudolph. (1819-1865). Kiesenwetter, H. von, *B.*, *Berlin. Ent. Ztschr.*, 9: 397-406, 1865; *P.*, *I. c.*, 10, 1866; Kiesenwetter, H. von, *B.*, *P.*, *Ann. Soc. Ent. France*, (4) 5: 643-648, 1865; Musgrave, A., *B.*, *Bib. Austr. Ent.*, p. 279, 1932.
- SCHAUPP, Franz G. ( -1904). *A.*, *Ent. News*, 15: 352, 1904; Leng, C. W., *Bull. Bklyn. Ent. Soc.*, 18: 1-12, 1923; Osborn, H., *P.*, *Fragments Ent. Hist.*, pp. 134, 143, 1937.
- SCHAUS, William. (1858-1942). Heinrich, C., et al., *Science*, 96: 244-245, 1942; Oberthür, C., *P.*, *Études Lép. Comp.*, 10 (plates): unpag., 1915; Williams, R. C., Jr., et al., *Ent. News*, 53: 239-240, 1942; Heinrich, C., et al., *B.*, *P.*, *Proc. Ent. Soc. Wash.*, 44: 189-195, 1942; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 234, 1937.
- SCHENCK, Adolph. (1803-1878). *A.*, *Ent. Nachr.*, 4: 79, 165, 1878; Kraatz, G., *Deutsche Ent. Ztschr.*, 22: 225-226, 1878.

- SCHENKLING, Karl. ( -1911). Soldanski, H., *P.*, Deutsche Ent. Ztschr., pp. 730-732, 1911.
- SCHILLING, Peter Samuel. (1773-1852). *A.*, Arb. Schles. Ges. Vaterl. Kultur, p. 17, 1852.
- SCHILSKY, Julius. (1848-1912). Horn, W., *P.*, Ent. Blätter, 8: 241-243, 1912; Pape, P., *P.*, Deutsche Ent. Ztschr., pp. 604-608, 1912; *A.*, Wien. Ent. Zeit., 31: 336, 1912; Horn, W., *B.*, *P.*, Ent. Blätter, 5: 97-102, 1909; Semenov-Tian-Shanskij, A., Rev. Russe Ent., 12: 640, 1912.
- SCHINER, Ignaz Rudolph. (1813-1873). Frauenfeld, G. R., von, Verh. zool.-bot. Ges. Wien, 23: 465-468, 1873; Brauer, F., *P.*, Bot. & Zool. in Oesterr. 1850-1900 Festschrift, pp. 344-345, 1901; Osten-Sacken, C. R., Record of my life and work in entomology, pp. 158-164, 1903; Musgrave, A., Bib. Austr. Ent., p. 280, 1932.
- SCHINZ, Heinrich Rudolph. (1777-1861). *A.*, *B.*, Compt. Rend. 45th Sess. Soc. Suisse Sci. Nat. (Lausanne), pp. 157-166, 1861.
- SCHIÖDTE, Jörgen Matthias Christian. (1815-1884). Dunning, J. W., Trans. Ent. Soc. Lond., (Proc.), pp. xxxix-xl, 1884; Hansen, H. J., *B.*, Ent. Tidskr., 5: 101-110, 207-208, 1884; Bourgeois, J., *B.*, Ann. Soc. Ent. France, (6) 5: 473-480, 1885; Henriksen, K. L., *P.*, Ent. Meddel., 15: 226-241, 1926; Howard, L. O., *P.*, Hist. Applied Ent., 1930.
- SCHIRACH, Adam Gottlob. ( -1773). Buzairies, L. A., Apiculteur, 10: 110-113, 1865-66.
- SCHLECHTENDAL, Diederich H. R. von. ( -1916). Soldanski, H., Deutsche Ent. Ztschr., p. 364, 1916; *A.*, Ent. Blätter, 12: 290, 1916.
- SCHLETTERER, August. (1850-1908). Kohl, F. F., *B.*, Verh. zool.-bot. Ges. Wien, 58: 529-531, 1908; Musgrave, A., *B.*, Bib. Austr. Ent., p. 280, 1932.
- SCHMARDA, Ludwig Karl. (1819-1908). *A.*, Zool. Anzeiger, 33: 176, 1908.
- SCHMID, Anton. (1809-1899). *A.*, Ent. Mo. Mag., 35: 194, 1899; Hofmann, O., *P.*, Ber. Naturw. Ver. Regensburg, 7: 134-138, 1901.
- SCHMIDT, Franz. (1814-1882). Staudinger, O., Stett. Ent. Zeit., 44: 113-114, 1883; *A.*, Zool. Anzeiger, 5: 364, 1882.
- SCHMIDT, Hermann. ( -1859). *A.*, Jahresb. Ges. Freunde Naturw. Gera, 3: 51-52, 1860.
- SCHMIDT, Karl. ( -1916). Soldanski, H., Deutsche Ent. Ztschr., p. 227, 1916.
- SCHMIDT, Wilhelm Ludwig Ewald. (1804-1843). Dieckhoff, L. A., Stett. Ent. Zeit., 4: 194-199, 1843.
- SCHMIDT-GOEBEL, Hermann Max. (1809-1882). *A.*, Zool. Anzeiger, 5: 556, 1882; *A.*, Leopoldina, 18: 209, 1882; Türkheim, H. von, Berlin. Ent. Ztschr., 27: ii, 1883.
- SCHMIEDEKNECHT, Otto. (1847-1936). Bergman, A., Ent. Ztschr., Frankfurt, 49: 537-538, 1936; Hellén, W., Notulae Ent., 16: 95-96, 1936; Hedicke, H., *P.*, Mitt. Deutsch. Ent. Ges., 7: 1-2, 1936; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 151, 1936; Seitz, A., Ent. Rundschau, 53: 233-235, 1936; *P.* only, Insektenbörse, 53: 41, 1936; Krieg, H., Anzeiger Schädlingssk., 3: 146, 1927; *A.*, Koleopt. Rundschau, 22: 121, 1936.
- SCHMITT, P. Jerome. (1857-1904). *A.*, *P.*, Ent. News, 15: 225-226, 1904; "H. F. D.," Can. Ent., 36: 188, 1904; Osborn, P., Fragments Ent. Hist., p. 235, 1937.
- SCHNABL, Johann. (1838-1912). Becker, T., *B.*, Jahresh. Ver. Schles. Insektenk. Breslau, 7: xxvi-xxxi, 1914; Jacobson, G., *B.*, *P.*, Rev. Russe Ent., 12: cii-cvi, 1912.
- SCHNEIDER, Hans Jacob Sparre. (1853-1918). Tullgren, A., Ent. Tidskr., 41: 145-146, 1920.
- SCHNEIDER, Louis. (1836-1901). *A.*, *P.*, Ent. News, 12: 256, 1901.
- SCHNEIDER, Oskar. (1841-1903). Kraatz, G., Deutsche Ent. Ztschr., 48: 7, 1904; *A.*, Leopoldina, 40: 39, 1904.
- SHOCH, Gustav. (1833-1899). Ris, F., *B.*, Mitt. Schweiz. Ent. Ges., 10: 211-217, 1899; *A.*, Deutsche Ent. Ztschr., 43: 222, 1899; Musgrave, A., *B.*, Bib. Austr. Ent., p. 281, 1932.
- SCHOENBORN, Henry F. (1833-1896). *A.*, Ent. News, 7: 256, 1896; Gill, T. N., Proc. Ent. Soc. Wash., 4: 49, 1896.



- SCHOENHERR, Carl Johann. (1772-1848). Carlson, G. W., Trans. Ent. Soc. Lond., 5, (Proc.): liii-iv, 1848; Dohrn, C. A., Stett. Ent. Zeit., 10: 193-199, 1849; Man-nerheim, C. G., von, B., Bull. Moscou, 22: 574-596, 1849; Musgrave, A., B., Bib. Austr. Ent., p. 282, 1932; Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., p. 266, 1823.
- SCHOLTZ, Heinrich. (1812-1859). Klette, A. M., Verh. Siebenbürg. Nat. Ver. 10: 240-241, 1860; Cohn, F., Jahresber. Schles. Ges. Vaterl. Kultur, 37: 34-35, 1859.
- SCHOLZ, Richard. (1866-1935). Kleine, R., P., Ent. Blätter, 31: 177, 1935.
- SCHOMBURGK, Robert Hermann. (1804-1864). Pascoe, F. P., Trans. Ent. Soc. Lond., (3) 2 (Proc.): 138, 1866; A., Ibis, 1: 240, 1865.
- SCHOTT, Arthur Carl Victor. (1814-1875). A., Leopoldina, 11: 164, 1875.
- SCHÖYEN, Wilhelm Moritza. (1844-1918). Tullgren, A., P., Ent. Tidskr., 41: 144-145, 1920; Howard, L. O., P., Hist. Applied Ent., 1930.
- SCHRANK, Franz von Paula. (1747-1835). Swainson, W., Bib. of Zool., p. 320, 1840; Gistel, J. N. F. X., Faunus, n. s., 1: 1, 5-8, 1837.
- SCHREIBER, Egid. (1836-1913). A., Schmid & Thesing's Biologen Kalender, 1: 365-366, 1914.
- SCHREIBERS, Karl Franz Anton von. (1775-1852). A., Verh. zool.-bot. Ges. Wien, 2: 46, 1852; Musgrave, A., B., Bib. Austr. Ent., p. 283, 1932.
- SCHREITER, C. Rodolfo. ( -1942). A., B., Rev. Soc. Ent. Arg., 12: 56-57, 1943.
- SCHRENCK (SCHRENCK), Leopold von. (1826-1894). Heyden, L. von, Wien. Ent. Zeit., 26: 77-78, 1907.
- SCHROEDER, VAN DER KOLK, Jacob Ludwig Conrad. (1797-1862). Vrolik, W., Jaarb. Akad. Wetensch. Amsterdam, pp. 161-191, 1862.
- SCHROETER, Johann Samuel. (1735-1808). Swainson, W., B., Bib. of Zool., p. 321, 1840.
- SCHUBERT, Karl. (1867-1911). Soldanski, H., P., Deutsche Ent. Ztschr., pp. 728-730, 1911.
- SCHUCKMANN, Waldemar Helmut Franz. (1883-1939). Sachtleben, H., Arb. phys. angew. Ent. Berlin-Dahlem, 6: 379, 1939.
- SCHUETZE, Julius. (1835-1904). Geiser, S. W., Field & Lab., 7: 46, 1939.
- SCHULTES, Joseph August. (1773-1831). Gistel, J., Faunus, 1: 52-53, 1832.
- SCHULTHESS-(SCHINDLER), Anton von. (1855-1941). Nadig, A., Jr., Mitt. Schweiz. Ent. Ges., 18: 398-399, 1941; Schneider-Orelli, O., B., P., Mitt. Schweiz. Ent. Ges., 16: 301-308, 1935; A., Ent. News, 53: 246, 1942.
- SCHULTZE, August. (1837-1907). Daniel, K., B., P., Münch. Kol. Ztschr., 3: 397-399, 1908; A., Wien. Ent. Zeit., 26: 348, 1907; A., P., Ent. Wochenbl., 24: 177, 1907; Horn, W., P., Deutsche Ent. Ztschr., p. 590, 1907.
- SCHUMACHER, Christian Friedrich. (1757-1830). Henriksen, K. L., P., Ent. Meddel., 15: 110-111, 1923.
- SCHUMMEL, Theodor Emil. (1786-1848). Letzner, K., 50-jähr. Bestehen Schles. Ges. Vaterl. Kultur, Ent. Sekt., pp. 16-18, 1858.
- SCHUSTER, Moritz. (1823-1894). A., Ent. News, 5: 96, 1894.
- SCHÜTZE, Karl Traugott. (1858-1938). Starke, H., P., Deutsche Ent. Ztschr. "Iris", 52: 184-185, 1938; A., Arb. morph. taxon. Ent. Berlin-Dahlem, 6: 69, 1939; Wrede, H., P., Ent. Ztschr., Frankfurt, 47, 77-78, 1933.
- SCHWAB, Adolf. (1806-1891). Reitter, E., Wien. Ent. Zeit., 10: 40, 1891.
- SCHWARZ, Eugene Amandus. (1844-1928). Howard, L. O., P., Ann. Ent. Soc. Amer., 22: 142-143, 1929; Wetmore, A., Rpt. U. S. Nat. Mus., p. 40, 1929; Howard, L. O., B., P., Proc. Ent. Soc. Wash., 30: 153-183, 1928; Caudell, A. N., Ent. News, 40: 31-32, 1929; Howard, L. O., Science, 68: 443, 1928; Horn, W., Ent. Mitteil., 17: 307-310, 1928; Wade, J. S., Proc. Ent. Soc. Wash., 38: 133-134, 1936; Musgrave, A., Bib. Austr. Ent., p. 283, 1932; Howard, L. O., P., Hist. Applied Ent., 1930; Essig, E. O., B., P., Hist. of Ent., pp. 756-758, 1931; Osborn, H., P., Fragments Ent. Hist., pp. 192-195, 1937.
- SCHWARZ, Hermann. (1876-1940). Meiners, E., P., Ent. News, 52: 118-119, 1941; A., Rev. Ent. (Rio de J.), 12: 417, 1941.
- SCHWARZ, Otto C. E. (1861-1908). Horn, W., P., Deutsche Ent. Ztschr., pp. 170-171,

- 172, 1909; Musgrave, A., B., *Bib. Austr. Ent.*, pp. 283-284, 1932; Semenov-Tian-Shansky, A., *Rev. Russe Ent.*, 8: 350, 1908.
- SCOPOLI, Johann Anton. (1723-1788). *Strecker, H., B., Butterflies and moths of N. A.*, p. 267, 1878; Swainson, W., B., *Bib. of Zool.*, pp. 322-323, 1840; Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, pp. 252-253, 1823; A., *Verh. zool.-bot. Ver. Wien*, 1: 150, 1850; Voss, W., B., *Verh. zool.-bot. Ges. Wien*, 31: 17-66, 1881.
- SCOTT, Alexander Walter. (1800-1883). *Scott's Australian Lepidoptera*, 2 (1): 4, 1890; Musgrave, A., B., *Bib. Austr. Ent.*, p. 284, 1932.
- SCOTT, John. (1823-1888). Dimmock, G., *Psyche*, 5: 156, 1889; Carrington, J. T., *Entomologist*, 21: 288, 1888; A., *Ent. Mo. Mag.*, 25: 114-116, 1888; Sharp, D., *Trans. Ent. Soc. Lond.*, (Proc.), pp. xlix-l, 1888.
- SCRIBA, Emil. (1834-1917). Reitter, E., *Wien. Ent. Zeit.*, 36: 228, 1917; A., *Ent. Blätter*, 13: 238, 1917.
- SCRIBA, W. (1807-1898). Kraatz, G., *Deutsche Ent. Ztschr.*, 42: 9, 1898.
- SCUDDER, Samuel Hubbard. (1837-1911). A., *Amer. Journ. Sci.*, (4) 31: 582, 1911; A., P., *Appalachia*, 12: 213, 276-279, 1912; A., P., *Nat. Cyclop. Amer. Biog.*, 3: 99-100, 1893; Benjamin, M., P., *Harper's Weekly*, 34: 925-926, 1890; Bethune, C. J. S., *Can. Ent.*, 43: 253-254, 1911; Dimmock, G., *Dimmock's Sp. Bib. no. 3*, pp. 1-28, 1879; Cockerell, T. D. A., B., *Science*, n. s., 34: 339-342, 1911; Turner, H. J., *Ent. Record*, 23: 255-256, 1911; Rehn, J. A. G., et al., B., P., *Ent. News*, 22: 289-292, 1911; Holland, W. J., et al., P., *Ann. Ent. Soc. Amer.*, 5: 72, 1912; Kingsley, J. S., et al., P., *Psyche*, 18: 175-192, 1911; Mayor, A., C., B., P., *Mem. Nat. Acad. Sci.*, 17: 81-104, 1924; Smith, J. B., P., *Pop. Sci. Mo.*, 76: 473-474, 1910; A., *Ent. Mo. Mag.*, 47: 279, 1911; A., *Entomologist*, 44: 376, 1911; Musgrave, A., *Bib. Austr. Ent.*, p. 285, 1932; A., *Who's Who in Science*, p. 444, 1913; Howard, L. O., P., *Hist. of Applied Ent.*, pp. 18-19, 34, 93, 537, 540, 1930; Morice, F. D., *Trans. Ent. Soc. Lond. (Proc.)*: cxxi, 1911; A., *Miscellanea Ent.*, 19 (8): 84, 1911; Essig, E. O., B., P., *Hist. of Ent.*, pp. 758-762, 1931; Osborn, H., P., *Fragments Ent. Hist.*, pp. 161-162, 1937.
- SEBA, Albert. (1665-1736). A., *Acta Acad. Nat. Curios.*, 6: 239-252, 1742; Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, pp. 247-248, 1823.
- SEEBER, C. Ernst. (1833-1895). A., *Ent. News*, 6: 172, 195-196, 1895.
- SEIB, Simon H. M. ( -1908). A., *Ent. News*, 19: 396, 1908.
- SEIDL, Wenzel Benno. (1773-1842). A., *Lotos*, 3: 188-191, 1853.
- SEIDLITZ, Georg von. (1840-1917). A., *Ent. Mo. Mag.*, 58: 22, 1922; Bickhardt, H., B., P., *Ent. Blätter*, 13: 239-248, 1917; A., *l. c.*, 13: 238, 1917; Reitter, E., *Wien. Ent. Zeit.*, 36: 228, 1917; Hedicke, H., *Deutsche Ent. Ztschr.*, pp. 191-192, 1918.
- SEIFERT, Otto. (1848-1910). A., *Can. Ent.*, 43: 16, 1911.
- SEISS, Covington Few. ( -1915). A., *Ent. News*, 26: 383-384, 1915.
- SEITNER, Moritz. (1862-1936). Schimitschek, E., *Koleopt. Rundschau*, 23: 55, 1937; Horn, W., *Arb. phys. angew. Ent. Berlin-Dahlem*, 3: 301, 1936; Schimitschek, E., B., P., *Ztschr., Angew. Ent.*, 19: 625-627, 1932.
- SEITZ, Adalbert. (1869-1938). Draudt, M., et al., P., *Ent. Rundschau*, 55: 262-276, 1938; Tuxen, S. L., *Ent. Meddel.*, 20: 187, 1938; Turati, E., *Boll. Soc. Ent. Ital.*, 70: 94, 1938; A., *Arb. morph. taxon. Ent. Berlin-Dahlem*, 5: 186, 1938; Meissner, O., P., *Ent. Ztschr., Frankfurt*, 43: 266, 1930; Urbahn, E., *Stett. Ent. Zeit.*, 99: 156, 1938; Kremky, J., *Polskie Pismo Ent.*, 16-17: 330-331, 1937-38; Haimbach, F., *Ent. News*, 41: 206-207, 1930; Musgrave, A., B., *Bib. Austr. Ent.*, pp. 285-286, 1932; A., *Koleopt. Rundschau*, 24: 121, 1938; Hering, M., P., *Mitt. Deutsch. Ent. Ges.*, 6: 6-7, 1935.
- SELBY, Prideaux John. (1788-1867). A., *Proc. Linn. Soc. Lond.*, pp. xxxvii-xxxviii, 1866-67; A., *Entomologist*, 3: 276 b, 1867.
- SELLMAN, Einar. (1890-1920). *Lundblad, O., P., Ent. Tidskr.*, 41: 141-143, 1920.
- SELYS-LONGCHAMPS, Michel Edmond de. (1813-1900). A., P., *Ent. Record*, 13: 79-80, 1901; Calvert, P. P., P., *Ent. News*, 12: 32, 33-37, 1901; McLachlan, R., *Ent. Mo. Mag.*, 37: 78-80, 1901; Verrall, G. H., *Trans. Ent. Soc. Lond.*, (Proc.), p. xlv, 1900; Kraatz, G., *Deutsche Ent. Ztschr.*, 44: 8-9, 1900; A., *Leopoldina*, 37: 39,

- 1900; Plateau, F., B., P., *Ann. Acad. Belg.*, 68: 145-157, 1901; Ris, F., *Mitt. Schweiz. Ent. Ges.*, 10: 367-369, 1901; Blasius, R., B., P., *Journ. Ornith.*, (5) 8: 361-381, 1901; Camerano, L., B., *Atti Accad. Torino*, 36: 327-334, 1902; Lameere, A., B., P., *Mem. Soc. Ent. Belg.*, 9: 1-32, 1902; Krüger, L., *Stett. Ent. Zeit.*, 62: 214-217, 1901; Dubois, A., *Bull. Soc. Zool. France*, 26: 24-28, 1901; Martin, R., l. c., 26: 28-29, 1901; Lameere, A., *Ann. Soc. Ent. Belg.*, 44: 467-472, 1900; A., P., *Insektenbörse*, 18: 81, 1901; Navas, L., *Bol. Soc. Espan. Hist. Nat.* 1: 74-77, 1901; Bargagli, P., *Bull. Soc. Ent. Ital.*, 33: 36-39, 1901; Mourlon, M., *Bull. Soc. Belge Geol., Paleontol., Hydrol.*, 14: 315-318, 1900; Musgrave, A., B., *Bib. Austr. Ent.*, p. 286, 1932; Lucas, W. J., *Entomologist*, 34: 32, 1901; Essig, E. O., B., P., *Hist. of Ent.*, pp. 762-764, 1931; Osborn, H., P., *Fragments Ent. Hist.*, 1937.
- SENAC, Hippolyte. (1830-1892). Lévillé, A., P., *Ann. Soc. Ent. France*, 63: 449-452, 1894.
- SEPP, Jan. (1778-1853). Heyden, E. von, *Stett. Ent. Zeit.*, 16: 16-17, 1855; Pritt-witz, O. F. W. L., *Stett. Ent. Zeit.*, 27: 276-277, 1866.
- SERRES, Olivier de. (1539-1619). Miall, L. C., *Early naturalists, their lives and work*, pp. 93-98, 1912; Chavannes, E., *Ann. Soc. Sericicole*, 7: 294-299, 1843.
- SERRES, Pierre Marcel Toussaint. (1780-1862). Gervais, P., B., *Mem. Acad. Montpellier, Sect. Sci.*, 5 (2): 303-308, 1862.
- SERVILLE, Jean Guillaume Audinet-. (1775-1858). Amyot, C. J. B., *Ann. Soc. Ent. France*, (3) 6: 343-351, 1858.
- SEUBERT, Moritz. (1818-1878). Knoblach, H., *Leopoldina*, 14: 49, 100-101, 1878.
- SEVERIN, Guillaume. (1862-1938). Lameere, A., P., *Bull. & Ann. Soc. Ent. Belg.*, 78: 313-314, 1938; A., *Arb. morph. taxon. Ent. Berlin-Dahlem*, 5: 352, 1938; Porter, C. E., *Rev. Chilena Hist. Nat.*, 42: 350, 1938.
- SCONINA, Kurt. (1913-1939). Sachtleben, H., *Arb. phys. angew. Ent. Berlin-Dahlem*, 6: 209, 1939.
- SHARP, David. (1840-1922). A., *Bull. Bklyn. Ent. Soc.*, 17: 149, 1922; A., *Ent. News*, 33: 288, 1922; Calvert, P. P., l. c., 33: 318-320, 1922; A., P., *Proc. Ent. Soc. Wash.*, 24: 207, 1922; Everts, E., *Tijdschr. Ent.*, 65: 219-220, 1922; Walker, J. J., P., *Ent. Mo. Mag.*, 58: 234-237, 1922; Lucas, W. J., P., *Entomologist*, 55: 217-221, 1922; Morice, F., *Ent. Record*, 34: 186-188, 1922; Muir, F., B., *Proc. Haw. Ent. Soc.*, 5: 335-339, 1923; A., *Boll. Soc. Ent. Ital.*, 55: 16, 1923; Rothschild, L. W., *Trans. Ent. Soc. Lond.*, (Proc.), p. lxxi, 1922; Mequignon, A., *Bull. Soc. Ent. France*, p. 230, 1922; A., *Cent. Hist. Ent. Soc. Lond.*, pp. 145-146, 1933; Sclater, W. L., P., *Zool. Record*, 58: v-vi, 1921 (1923); Musgrave, A., B., *Bib. Austr. Ent.*, 287-288, 1932; Hudson, G. V., *Trans. & Proc. N. Z. Inst.*, 54: xiv-xv, 1923.
- SHARP, Edwin P. (1869-1936). Chartres, S. A., *Entomologist*, 69: 244, 1936.
- SHARP, William E. (1856-1919). A., *Ent. News*, 31: 149, 1920; Fowler, W. W., *Ent. Mo. Mag.*, 55: 263, 1919.
- SHAW, Alfred Eland. (1861-1931). Musgrave, A., *Austr. Mus. Mag.*, 4: 232, 1931; Kelly, R., *Ent. Mo. Mag.*, 67: 253, 1931; Osborn, F. G. B., *Proc. Linn. Soc. N. S. Wales*, 57: iv, 1931.
- SHCHETINSKI, Alexander Antonovich. ( -1907). Kusnezov, N. J., *Rev. Russe Ent.*, 7: 76, 1907.
- SHELDON, William George. (1859-1943). Riley, N. D., P., *Entomologist*, 77: 17-19, 1944.
- SHELFORD, Robert Walter Campbell. (1872-1912). A., *Ent. Mo. Mag.*, 48: 218, 1912; A., *Ent. News*, 23: 388, 1912; Poulton, E. B., *Ent. Record*, 24: 204, 1912; Morice, F. D., *Trans. Ent. Soc. Lond.*, (Proc.): clxiv-clxv, 1912; Burr, M., P., *Ent. Record*, 24: 205-206, 1912; A., *Deutsche Ent. Ztschr.*, p. 608, 1912; Semenov-Tian-Shanskij, A., *Rev. Russe Ent.*, 12: 639-640, 1912; Musgrave, A., B., *Bib. Austr. Ent.*, p. 289, 1932.
- SHELKOVNIKOV, Alexander Borisovich. (1870-1937). Burr, M., P., *Ent. Record*, 49: 39-40, 1937.
- SHERBORN, Charles Davies. (1861-1942). A., *Ent. News*, 53: 218, 1942; Norman, J. R., *Nature*, 150: 146-147, 1942.

- SHESTAKOV, Andrei Valentinovich. (1890-1933). Gussakovsky, V. V., *B., P., Rev. Ent. URSS*, 25: 324-328, 1935.
- SHIMER, Henry. (1828-1895). *A., Ent. News*, 6: 240, 1895; *A., P., l. c.*, 6: 305-306, 1895; Howard, L. O., *P., Hist. Applied Ent.*, 1930; Osborn, H., *P., Fragments Ent. Hist.*, p. 143, 1937.
- SHIPLEY, Arthur Everett. (1861-1927). Harner, S. F., *Proc. Linn. Soc. Lond.*, pp. 130-137, 1927-28; Howard, L. O., *P., Hist. of Applied Ent.*, 1930.
- SHIOCH, Gustav. (1833-1899). Ris, F., *B., Mitt. Schweiz. Ent. Ges.*, 10: 211-217, 1899; *A., Wien. Ent. Zeit.*, 18: 132, 1899; Kraatz, G., *Deutsche Ent. Ztschr.*, 43: 222, 1899.
- SHUBERG, August. (1865-1939). Sachtleben, H., *Arb. phys. angew. Ent. Berlin-Dahlem*, 6: 209, 1939.
- SHUCKARD, (1803-1868). *A., B., Entomologist*, 4: 180-182, 1868-69; Bates, H. W., *Trans. Ent. Soc. Lond.*, (Proc.), pp. lvi-lvii, 1868; Swainson, W., *B., Bib. of Zool.*, pp. 325-326, 1840; Musgrave, A., *B., Bib. Austr. Ent.*, pp. 290-291, 1932.
- SHUGUROV, Alexander Mikailovich. (1881-1912). Laister, A., *B., Rev. Russe Ent.*, 12: 624-627, 1912.
- SICHEL, Jules. (1802-1868). Radoszkovsky, O., *Horae Soc. Ent. Ross.*, 6: 140-141, and footnote, 1869; Mulsant, E., *B., P., Ann. Soc. Linn. Lyon*, n. s., 17: 383-410, 1869; Dours, J. A., *B., Mem. Soc. Linn. Nord France*, 2: 272-279, 1868-71; Musgrave, A., *B., Bib. Austr. Ent.*, p. 291, 1932.
- SIDEBOTHAM, Joseph. (1823-1885). *A., Ent. Mo. Mag.*, 22: 46, 1885; *A., Journ. Bot.*, 23: 319-320, 1885.
- SIEBOLD, Carl Theodor Ernst von. (1804-1885). *A., Ent. Mo. Mag.*, 21: 280, 1885; Ehlers, E., *B., P., Ztschr. wissen. Zool.*, 42: i-xxxiv, 1885; *A., Athenaeum*, no. 2999, p. 507, 1885; Locy, W. A., *P., Story of Biol.*, pp. 327-328, 1925; Norden-skiöld, Erik, *Hist. of Biol.*, p. 417, 1935.
- SIEBOLD, Philipp Franz. (1796-1866). *A., Zool. Garten*, 7: 435, 1866; Martius, T. W. C., *Sitzb. Akad. München*, 1: 387-388, 1867.
- SIEWERS, Charles G., 1814-1882). *A., Ann. Rpt. Ent. Soc. Ont.*, 14: 82-83, 1883; Dury, C., *Can. Ent.*, 14: 176, 1882.
- SIGNORET, Victor Antoine. (1816-1889). Distant, W. L., *Entomologist*, 22: 144, 1889; *A., Ent. Mo. Mag.*, 25: 309, 1889; Laboulbène, A., *Ann. Soc. Ent. France*, (6) 9, (Bull.): lxxviii-lxix, 1889; Fairmaire, L., *B., P., Ann. Soc. Ent. France*, (6) 9: 505-512, 1889; Musgrave, A., *B., Bib. Austr. Ent.*, pp. 291-292, 1932; Essig, E. O., *B., P., Hist. of Ent.*, pp. 764-765, 1931; Osborn, H., *P., Fragments Ent. Hist.*, p. 230, 1937.
- SILBERMANN, Gustave Henri Rodolphe. (1801-1877). Baruthio, C., *P., Bull. Soc. Hort. Bas-Rhin*, 2nd Semestre, pp. 5-7, 1924.
- SIMANTON, Frank Leslie. (1875-1935). "W. A. S.", *Journ. Econ. Ent.*, 29: 224, 1936.
- SIMON, Eugène. (1848-1924). *A., Ent. News*, 36: 222-224, 1925; Berland, L., *B., P., Ann. Soc. Ent. France*, 94: 73-100, 1925; Pickard, F., *Bull. Soc. Ent. France*, pp. 193-194, 1924.
- SIMONOV, Nikolai Pavlovich. (1881-1912). Derzhavin, A., *Rev. Russe Ent.*, 12: 628, 1912.
- SIMPSON, Charles B. Simpson. (1876-1907). *A., Ent. News*, 18: 112, 1907; *A., Leopoldina*, 43: 55, 1907; Horn, W., *Deutsche Ent. Ztschr.*, p. 348, 1907.
- SIRKKA, Pauli Wilhelm. (1912-1940). *A., Ann. Ent. Fenn.*, 6: 5, 7, 1940.
- SKINNER, Henry. (1861-1926). *A., P., Ent. News*, 22: 1-2, 1911; *A., Ent. News*, 37: 192, 215, 1926; Calvert, P. P., *B., P., Ent. News*, 37: 225-249, 1926; Williams, R. C., Jr., et al., *P., Ann. Ent. Soc. Amer.*, 20: 140, 1927; *A., Ent. Mo. Mag.*, 63: 17, 1927; *A., Entomologist*, 59: 232, 1926; Holland, W. J., *Ann. Carnegie Mus.*, 17: 197-198, 1926-27; Osborn, H., *P., Fragments Ent. Hist.*, p. 186, 1937.
- SKINNER, James William. (1855-1931). Davis, J. J., *Ann. Ent. Soc. Amer.*, 25: 251, 1932.
- SKUSE, Frederick A. Askew. (1864-1896). Alexander, C. P., *P., Proc. Linn. Soc. N. S. Wales*, 57: 6-7, 1932; Fuller, C., *Agr. Gazette N. S. Wales*, 7: 598, 1896; Musgrave, A., *B., Bib. Austr. Ent.*, pp. 293-294, 1932.

- SLADEN, Charles Andrew. (1851-1928). Russell, S. G. C., *Entomologist*, 61: 240, 1928; Russell, G. S. C., *Entomologist*, 62: 192, 1929.
- SLADEN, Frederick William Lambart. (1876-1921) *A.*, *Ent. News*, 33: 128, 1922; Gibson, A., *Can. Ent.*, 53: 240, 1921; "M.", *Ent. Mo. Mag.*, 58: 111-113, 1922.
- SLEIGHT, Charles Edwin. (1860-1917). *A.*, *Ent. News*, 29: 280, 1918; Davis, W. T., *Journ. N. Y. Ent. Soc.*, 26: 47-48, 1918.
- SLINGERLAND, Mark Vernon. (1864-1909). *A.*, *Nat. Cyclop. Amer. Biog.*, 13: 314-315, 1906; Bethune, C. J. S., *Can. Ent.*, 41: 170, 1909; Comstock, J. H., *P.*, *Journ. Econ. Ent.*, 2: 195-196, 1909; Comstock, J. H., *Ent. News*, 20: 217-219, 1909; Comstock, J. H., et al., *B.*, *P.*, *N. Y. Agr. Exp. Sta. (Cornell) Bull.* 348, pp. 623-651, 1914; Howard, L. O., *P.*, *Hist. Applied Ent.*, 1930; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 203, 1937.
- SLOANE, Hans. (1660-1752). Strecker, H., *B.*, *Butterflies and moths of N. A.*, p. 270, 1878.
- SLOANE, Thomas Gibson. (1857-1932). Carter, H. J., *P.*, *Victorian Nat.*, 49: 191-194, 1932; *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 1: 310, 1934; Musgrave, A. B., *Bib. Austr. Ent.*, pp. 294-297, 1932.
- SLOSSON, Annie Trumbull. (1838-1926). Davis, W. T., *P.*, *Journ. N. Y. Ent. Soc.*, 34: 361-364, 1926; Leng, C. W., *I. c.*, 26: 129-133, 1918; Skinner, H., *Ent. News*, 30: 200, 1919; Calvert, P. P., *I. c.*, 38: 128, 1927; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 208, 1937.
- SMEATHMAN, Henry. (1750-1787). Swainson, W., *Bib. of Zool.*, pp. 329-330, 1840.
- SMITH, Benjamin Hayes. (1841-1918). Stone, W., *Ent. News*, 30: 88-90, 1919.
- SMITH, Emily Adella. ( - ). Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 185, 1937.
- SMITH, Frederick. (1805-1879). *A.*, *Ann. Rpt. Ent. Soc. Ont.*, 10: 36, 1879; *A.*, *Can. Ent.*, 11: 78, 1879; Dunning, J. W., *Trans. Ent. Soc. Lond.*, (Proc.), pp. lxi-vi, 1879; *A.*, *Ent. Nachr.*, 5: 121, 1879; *A.*, *Deutsche Ent. Ztschr.*, 23: 8, 1879; Musgrave, A. B., *Bib. Austr. Ent.*, pp. 297-298, 1932; *A.*, *Zool. Anzeiger*, 2: 168, 1879.
- SMITH, George Dole. (1833-1880). Mann, B. P., *Psyche*, 3: 199, 1881; Orne, J., *Proc. Bost. Soc. N. H.*, 21: 51-53, 1880; *A.*, *Amer. Nat.*, 14: 756, 1880.
- SMITH, Herbert Huntingdon. (1851-1919). *A.*, *Ent. News*, 30: 210, 1919; Holland, W. J., *P.*, *I. c.*, 30: 211-214, 1919; Holland, W. J., *Science*, n. s., 49: 481-483, 1919; Osborn, H., *Fragments Ent. Hist.*, p. 230, 1937.
- SMITH, James Edward. (1759-1828). Goode, G. B., *P.*, *Ann. Rpt. Smithsn. Inst.*, 1897, vol. 2, pt. 2, pp. 418, 429, 1901; Strecker, H., *B.*, *Butterflies and moths of N. A.*, p. 209, 1878; "T.", *Mag. Nat. Hist.*, 1: 91-93, 1829.
- SMITH, John Bernhard. (1858-1912). *A.*, *Amer. Journ. Sci.*, (4) 33: 388, 1912; *A.*, *Ent. News*, 23: 192, 1912; *A.*, *Nat. Cyclop. Amer. Biog.*, 13: 201-202, 1906; *A.*, *P.*, *Nat. Cyclop. Amer. Biog.*, 15: 71-72, 1916; *A.*, *Science*, n. s., 34: 613-614, 1912; Gibson, A., *P.*, *Can. Ent.*, 44: 97-99, 1912; Grossbeck, J. A., *P.*, *Ent. News*, 23: 193-196, 1912; Turner, H. J., *Ent. Record*, 24: 203-204, 1912; Howard, L. O., et al., *Proc. Ent. Soc. Wash.*, 14: 111-117, 1912; Osborn, H., *P.*, *Journ. Econ. Ent.*, 5: 234-236, 1912; Howard, L. O., *P.*, *Hist. Applied Ent.*, 1930; Osborn, H., *P.*, *Fragments Ent. Hist.*, pp. 166-167, 1937.
- SMITH, Ralph Ingram. (1882-1927). "E. R. S.", *P.*, *Journ. Econ. Ent.*, 20: 651-652, 1927; Osborn, H., *Fragments Ent. Hist.*, pp. 217-218, 1937.
- SMITH, Sidney. ( -1884). Dimmock, G., *Psyche*, 4: 266, 1884; *A.*, *Entomologist*, 18: 56, 1885.
- SMITH, Sidney Irving. (1867-1926). Verrill, A. E., *Rpt. Nat. Acad. Sci.*, pp. 115-116, 1927; Verrill, A. E., *Science*, n. s., 64: 57-58, 1926; Osborn, H., *P.*, *Fragments Ent. Hist.*, 1937.
- SMITH, Theobald. (1859-1934). *A.*, *Ent. News*, 46: 34, 1935; Howard, L. O., *P.*, *Hist. of Applied Ent.*, 1930.
- SMYTH, Ellison Adger, Jr. (1863-1941). Calvert, P. P., *Ent. News*, 52: 270, 1941; *A.*, *Science*, 94: 204, 1941; Osborn, H., *Fragments Ent. Hist.*, p. 280, 1937.
- SNELLEN, Pieter Cornelius Tobias. (1832-1911). Fowler, W. W., *Ent. Mo. Mag.*, 47: 114, 1911; Wheeler, G., *Ent. Record*, 23: 232, 1911; "H.", *Iris*, 25: 125, 1911;

- Piepers, M. C., *P.*, Tidschr. Ent., 55: 1-8, 1912; Morice, F. D., Trans. Ent. Soc. Lond. (Proc.): cxxi, 1911; Kuhnt, P., Deutsche Ent. Ztschr., p. 491, 1911.
- SNOW, Francis Huntington. (1840-1908). Green, J. W., et al., *P.*, Grad. Mag. Univ. of Kansas, 7: 121-146, 1908; *A.*, Journ. Econ. Ent., 1: 411, 1908; Kellogg, V. L., *I. c.*, 2: 83-85, 1909; *A.*, Nat. Cyclop. Amer. Biog., 9: 494-495, 1907; *A.*, *P.*, Outlook, 59: 876, 1898; McClung, C. E., Ent. News, 19: 447-449, 1908; Goding, F. W., Kansas Hort. Soc. Rpt., 1: 226-228, 1887-88 (1889); *A.*, *P.*, Journ. Kansas Ent. Soc., 5: 32, 1932; Horn, W., Deutsche Ent. Ztschr., p. 169, 1909; Howard, L. O., *P.*, Hist. Applied Ent., p. 104, 1930; Osborn, H., *P.*, Fragments Ent. Hist., p. 224, 1937.
- SNOW, William A. ( -1899). Mik, J., Wiener Ent. Zeit., 19: 88, 1900.
- SNYDER, Howard Austin. (1854-1934). *A.*, Ent. News, 45: 140, 1934.
- SÖDERMAN, Henrik. (1876-1933). Hellén, W., *P.*, Notulae Ent., 14: 59-61, 1934.
- SODOFFSKY, Carl Heinrich Wilhelm. (1797-1858). *A.*, Correspondenzbl. Nat. Ver. Riga, 11: 124-125, 1859.
- SOKOLÁR, Franz. (1851-1913). Heikertinger, F., *B.*, *P.*, Ent. Blätter, 9: 265-269, 1913.
- SOLIER, Antoine Joseph Jean. (1792-1851). Mulsant, E., *B.*, Opusc. Ent., 1: 82, 1852; Westwood, J. O., *B.*, Trans. Ent. Soc. Lond., (2) 2, (Proc.): 52-53, 1853.
- SOLSKY, Simon Martinovich. (1831-1879). Portschinsky, I., *B.*, *P.*, Horae Soc. Ent. Ross., 30: vii-x, 1896; *A.*, Naturaliste, 7: 56, 1879.
- SOLTAU, Hugo. (1855-1899). Wickham, H. F., Ent. News, 11: 450, 1900; Schwarz, E. A., Proc. Ent. Soc. Wash., 4: 405, 1899.
- SOMMER, M. C., ( -1868). Henriksen, K. L., *P.*, Ent. Meddel., 15: 165-166, 1925.
- SORAUER, Paul Carl Moritz. (1839-1916). Soldanski, H., Deutsche Ent. Ztschr., pp. 87-88, 1916.
- SORHAGEN, Ludwig Friedrich. (1836-1914). *A.*, Deutsche Ent. Ztschr., p. 88, 1915.
- SORSAKOSKI, Onni. (1867-1936). Hellén, W., Notulae Ent., 16: 94-95, 1936.
- SOUTH, Richard. (1846-1932). Riley, N. D., *P.*, Entomologist, 65: 96, 97-100, 1932; Turner, H. J., Ent. Record, 44: 68, 1932; "A. E. S.", Ent. Mo. Mag., 68: 118-119, 1932.
- SPALDING, Thomas Utting. (1866-1929). Tanner, V. M., Ent. News, 40: 343-344, 1929; *A.*, Bull. Bklyn. Ent. Soc., 38: 107, 1943.
- SPALLANZANI, Lazzaro. (1729-1799). Espada, J. de la, Anal. Soc. Esp. Nat., 1: 163-181, 1872; Locy, W. A., *P.*, Story of Biol., pp. 444-447, 1925; Nordenskiöld, Erik, Hist. of Biol., pp. 247-248, 1935.
- SFANGBERG, Jacob. (1846-1894). Kraatz, G., Deutsche Ent. Ztschr., 39: 278-279, 1895; Sandahl, P. T., *B.*, *P.*, Ent. Tidskr., 15: 165-168, 1894; Musgrave, A., Bibliog. Austr. Ent., p. 300, 1932.
- SPARRE SCHNEIDER, Hans Jacob. (See under SCHNEIDER).
- SPENCE, William. (1783-1860). *A.*, *P.*, Cuvier's Animal Kingdom, 4: iii-vii, 1836; *A.*, Proc. Linn. Soc. Lond., pp. xxxi-xxxii, 1860; *A.*, Proc. Roy. Soc. Lond., 11: xxx-xxxii, 1860-62; Stainton, H. T., Trans. Ent. Soc. Lond. (Proc.) (n. s.) 5: 92-94, 1858-61; "T. S.", Trans. Sci. Field Nat. Club Hull, 3: 285-290, 1907; *A.*, Cent. Hist. Ent. Soc. Lond., pp. 127-128, 1933.
- SPESSIVTSEFF, Paul. (1866-1938). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 5: 295, 1938.
- SPEYER, Adolph. (1812-1892). Speyer, O., et al., Iris, 6: 37-68, 1893.
- SPINOLA, Maximilian. (1780-1857). Gestro, R., *B.*, *P.*, Ann. Mus. Civ. Stor. Nat. Genova, 47: 33-53, 1915; Swainson, W., Bib. Zool., p. 334, 1840; Musgrave, A., Bibliog. Austr. Ent., p. 301, 1932.
- SPIX, Johann Baptist von. (1781-1826). Gistel, J., *B.*, Faunus, 2 (Suppl.), Gallerie no. 2: 7-8, 1835.
- SPORMAN, Karl. (1853-1937). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 5: 72, 1938.
- SPRAGUE, Philip L. (1829-1874). *A.*, Ann. Rpt. Ent. Soc. Ont., 6: 24, 1875; "F. G. S.", Can. Ent., 7: 95-96, 1875; "F. G. S.", Amer. Journ. Numismatics, 9: 95, 1875.



- SPRENGEL, Christian Konrad. (1750-1816). Soldanski, H., *Deutsche Ent. Ztschr.*, pp. 229-230, 1916; Locy, W. A., *Story of Biol.*, pp. 412-443, 1925.
- SPRING, Frederic Antoine Joseph. (1814-1872). *A., Rev. Sci. France et Etrang.*, (2) 2: 931-932, 1872; Dewalque, G., et al., *Bull. Acad. Sci. Belg.*, (2) 33: 93-102, 1872; Schwann, T., *B., P., Ann. Acad. Belg.*, 40: 251-290, 1874; *A., Leopoldina*, 7: 92, 1872.
- SPRY, Frank Palmer. (1858-1922). Barnard, F. C. A., et al., *P., Victorian Nat.*, 39: 60-62, 1922; Musgrave, A., *Bib. Austr. Ent.*, p. 301, 1932.
- SPULER, Anthony. (1889-1932). Webster, R. L., *P., Journ. Econ. Ent.*, 25: 939-941, 1932; Hungerford, H. B., *Ann. Ent. Soc. Amer.*, 27: 123, 1934.
- SPULER, Arnold. (1869-1937). "W.", *Ent. Ztschr. Frankfurt*, 51: 54, 1937; *A., Arb. morph. taxon. Ent. Berlin-Dahlem*, 4: 241, 1937.
- STABILE, Giuseppe. (1827-1869). *A., Bull. Soc. Ent. Ital.*, 2: 100, 1870; Riva, A., *Actes Soc. Helvet. Sci. Nat. (Soleure)*, Sess. 53: 205-209, 1869; Sordelli, F., *Atti Soc. Ital. Sci. Nat.*, 12: 173-179, 1869.
- STAEGER, Rasmus Carl. (1800-1875). Henriksen, K. L., *P., Ent. Meddel.*, 15: 179-182, 1925.
- STANTON, Henry Tibbats. (1822-1892). *A., Ent. Record*, 3: 307, 1892; Douglas, J. W., et al., *B., P., Ent. Mo. Mag.*, 29: 1-4, 1893; Ragonot, E. L., *B., Ann. Soc. Ent. France*, 62: 405-408, 1893; Douglas, J. W., et al., *B., Stett. Ent. Zeit.*, 53: 323-329, 1892; *A., Entomologist*, 26: 24, 1893; Bethune, C. J. S., *Ann. Rpt. Ent. Soc. Ont.*, 24: 108-109, 1893; Musgrave, A., *B., Bib. Austr. Ent.*, p. 302, 1932; *A., Cent. Hist. Ent. Soc. Lond.*, pp. 135-136, 1933; *A., Insect Life*, 5: 286, 1893.
- STAL, Carl. (1833-1878). Bates, H. W., *Trans. Ent. Soc. Lond.*, (Proc.): lxvii, 1878; Reuter, O. M., *Ent. Mo. Mag.*, 15: 72, 94-96, 1878; Reuter, O. M., *P., Distant's Insecta Transvaaliensis*, p. 197, 1907; Signoret, V., *B., Ann. Soc. Ent. France*, (5) 8: 177-186, 1878; *A., Ent. Nachr.*, 4: 260-261, 1878; Spangberg, J., *B., Stett. Ent. Zeit.*, 40: 97-105, 1879; *A., Pet. Nouv. Ent.*, 2: 247, 1878; "S.", *Mitt. Schweiz. Ent. Ges.*, 5: 388-391, 1878; Horvath, G., *Termes. Fuzetek*, 2: 210-212, 1878; Bolivar, I., *Anal. Espan. Hist. Nat.*, 7 (Actes): 59-61, 1878; Musgrave, A., *B., Bib. Austr. Ent.*, pp. 302-304, 1932; Essig, E. O., *B., P., Hist. of Ent.*, pp. 765-767, 1931; Osborn, H., *P., Fragments Ent. Hist.*, 1937.
- STALEY, Oliver Jacob. (1869-1894). *A., Ent. News*, 5: 236, 1894; *A., Ent. News*, 6: 172, 1895.
- STANDEN, Richard S. (1835-1917). *A., Ent. News*, 29: 240, 1918; Rowland-Brown, H., *Entomologist*, 50: 263-264, 1917; Champion, G. C., *Ent. Mo. Mag.*, 53: 279, 1917.
- STANDFUSS, Gustav. (1815-1897). Wocke, M. F., *Ztschr. Ent. (Breslau)*, 23: 39-40, 1898.
- STANDFUSS, Maximilian Rudolph. (1854-1917). *A., Bull. Soc. Ent. France*, p. 229, 1917; Pfaff, G., et al., *P., Festschr. 50 jähr. Bestehen Internat. Ent. Ver. Frankfurt*, p. 2, 1934; Oberthür, C., *P., Études Léop. Comp.*, 10 (plates): unpagéd, 1915; *A., Wien. Ent. Zeit.*, 36: 40, 1917; Hedicke, H., *Deutsche Ent. Ztschr.*, pp. 325-326, 1917; Howard, L. O., *P., Hist. of Applied Ent.*, 1930.
- STANDISH, Benjamin. (1783-1866). Newman, E., *Entomologist*, 3: 204-b, 1867.
- STANDISH, Francis Oram. (1832-1880). Carrington, J. T., *Entomologist*, 13: 142, 1880; *A., Zool. Anzeiger*, 3: 288, 1880.
- STANNIUS, Friedrich Herrmann. (1808-1883). Nordenskiöld, Erik, *Hist. of Biol.*, pp. 417-418, 1935.
- STAUDINGER, Otto. (1830-1900). *A., Ent. Record*, 12: 352-353, 1900; Calvert, P. P., *Ent. News*, 12: 32, 1901; Elwes, H. J., *Trans. Ent. Soc. Lond.*, (Proc.), pp. xxvi-xxxii, 1900; Kraatz, G., *Deutsche Ent. Ztschr.*, 44: 7-8, 1900; Seibold, T. L. F., *P., Ann. Soc. Ent. France*, 70: 6-7, 1901; Hering, E., *Stett. Ent. Zeit.*, 61: 389-395, 1900; Thieme, O., *Berlin. Ent. Ztschr.*, 45: 309-311, 1900; "E. B.", *Ent. Nachr.*, 26: 361-363, 1900; Kirby, W. F., *Entomologist*, 33: 323-324, 1900; "S.", *B., P., Iris*, 13: 341-358, 1900; "A. C.", *Bull. Soc. Ent. Ital.*, 33: 40-42, 1901; Martin, L., *Deutsche Ent. Ztschr.*, 14: 381, 1901; Musgrave, A., *Bib. Austr. Ent.*, p. 304, 1932.
- STAUFFER, Jacob. (1809-1880). *A., Amer. Nat.*, 14: 466, 1880.

- STECK, Hermann. (1882-1937). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 242, 1937.
- STECK-(HOFMANN), Theodor. (1857-1937). Benson, R. B., Ent. Mo. Mag., 73: 46, 1937; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 160, 1937; Schulthess, A. von, Mitt. Schweiz. Ent. Ges., 17: 1-3, 1937; Morgenthaler, O., et al., *P.*, Mitt. Schweiz. Ent. Ges., 17: 179-185, 1937.
- STEEL, Thomas. (1858-1925). Carter, H. J., Proc. Linn. Soc. N. S. Wales, 51 (1): vii, 1926; Musgrave, A., Bib. Austr. Ent., pp. 304-305, 1932.
- STEENSTRUP, Johann Japetus Smith. (1813-1897). Henriksen, K. L., *P.*, Ent. Meddel., 15: 153-156, 1925; Nordenskiöld, Erik, Hist. of Biol., pp. 418-420, 1935.
- STEIN, Paul. (1852-1921). Kramer, H., Deutsche Ent. Ztschr., pp. 236-237, 1922; Musgrave, A., Bib. Austr. Ent., p. 305, 1932.
- STEIN, Samuel Friedrich Nathaniel von. (1818-1885). Dimmock, G., Psyche, 4: 266, 1885; Brauer, F., *P.*, Bot. & Zool. in Oesterr. 1850-1900 Festschr., p. 498, 1901; *A.*, Naturaliste, 7 (9): 72, 1885; Nordenskiöld, Erik, Hist. of Biol., pp. 429-430, 1935.
- STEINHEIL, Eduard. (1830-1878). Forel, A., *B.*, Mitt. Muench. Ent. Ver., 3: 1-5, 1879.
- STEMPEL, Walter. (1869-1938). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 5: 295, 1938.
- STENDELL, Walter. (1889-1914). *A.*, Ent. News, 26: 240, 1915; *A.*, Deutsche Ent. Ztschr., p. 649, 1914.
- STEP, Edward. (1855-1931). Adkin, R., Entomologist, 64: 287-288, 1931; Turner, H. J., Ent. Record, 44: 16, 1932; Blair, K. G., *P.*, Proc. So. Lond. Ent. & N. H. Soc., pp. 34-35, 1931-32; Pugsley, H. W., Proc. Linn. Soc. Lond., pp. 189-190, 1931-32.
- STEPHENS, James Francis. (1792-1852). Strecker, H., *B.*, Butterflies and moths of N. A., p. 273, 1878; Swainson, W., *B.*, Bib. of Zool., pp. 336-337, 1840; Westwood, J. O., *B.*, Trans. Ent. Soc. Lond., (2) 2 (Proc.): 45-50, 1853; *A.*, Cent. Hist. Ent. Soc. Lond., pp. 129-130, 1933; Newman, E., Zoologist, 11: 3744-3745, 1864, 1853; *A.*, *B.*, Gardener's Chronicle (Newspaper) Jan. 8, p. 15, 1853.
- STERLER, Alois. (1787-1831). Gistel, J., Faunus, 1: 51, 1832.
- STEVEN, Christian von. (1781-1863). Nordmann, A. von, *P.*, Bull. Soc. Imp. Nat. Moscou, 38 (1): 101-161, 1865.
- STEVENS, Nettie M. (1861-1912). Calvert, P. P., Ent., News, 23: 288, 1912.
- STEVENS, Samuel. (1817-1899). *A.*, Ent. Mo. Mag., 35: 238-239, 1899.
- STICHEL, Hans. (1862-1936). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 300, 1936; Mell, R., Mitt. Deut. Ent. Ges., 7: 69-71, 1937; *A.*, Koleopt. Rundschau, 23: 116, 1937; Musgrave, A., *B.*, Bib. Austr. Ent., p. 305, 1932.
- STICKNEY, Fenner Satherthwaite. (1892-1936). Boyden, B. L., Journ. Econ. Ent., 30: 220-221, 1937; Mickel, C. E., Ann. Ent. Soc. Amer., 30: 183, 1937; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 159, 1937.
- STIDHAM, Isaac Ferdinand. (1837-1913). Skinner, H., Ent. News, 24: 321-322, 1913.
- STIERLIN, Wilhelm Gustav. (1821-1907). Stierlin, R., *B.*, *P.*, Mitt. Schweiz. Ent. Ges., 11: 267-273, 1908; Daniel K., *B.*, *P.*, Münch. Kol. Ztschr., 3: 394-397, 1908; *A.*, *P.*, Ent. Wochenbl., 24 (20): 83, 1907; Horn, W., *P.*, Deutsche Ent. Ztschr., pp. 450-451, 1907; *A.*, Leopoldina, 43: 56, 1907.
- STILES, Charles Wardell. (1867-1941). Wade, J. S., Proc. Ent. Soc. Wash., 38: 136, 1936; Usinger, R. L., Pan-Pacific Ent., 17: 84, 1941; *A.*, Rev. Ent. (Rio de J.), 12: 417, 1941; *A.*, Science, 93: 103, 1941; Osborn, H., *P.*, Fragments Ent. Hist., p. 181, 1937.
- STOBBE, Rudolf. (1885-1915). Ramme, W., *P.*, Deutsche Ent. Ztschr., pp. 371-375, 1916.
- STOCKHAUSEN, Paul C. (1857-1935). Calvert, P. P., et al., *P.*, Ent. News, 46: 203-204, 1935; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 2: 309, 1935.
- STOLICZKA, Ferdinand. (1838-1874). Crosse, H., et al., Journ. de Conchyl., 23: 97-98, 1875; "W. T. B.", Nature, 10: 185-186, 1874; Stearns, R. E. C., Proc. Calif. Acad. Sci., 5: 363-364, 1874; Musgrave, A., Bib. Austr. Ent., p. 305, 1932.
- STOLL, Caspar. ( -1795). Swainson, W., *B.*, Bib. of Zool., p. 337, 1840.

- STOLTZ, Hamilkar. (1867-1934). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 2: 63, 1935; Heikertinger, F., Koleopt. Rundschau, 20: 244, 1934.
- STONE, Stephen. (1810-1866). Newman, E., Entomologist, 3: 154-b, 1866.
- STORER, David Humphreys. (1804-1891). Scudder, S. H., Proc. Amer. Acad. Arts & Sci., 27: 388-391, 1893.
- STOTT, Charles Ernest. (1868-1935). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 64, 1936; *A.*, Ent. Mo. Mag., 71: 212-213, 1935.
- STRACENER, Charles Lyman. (1878-1941). Eddy, C. O., Journ. Econ. Ent., 35: 116-117, 1942.
- STRAUS-DUERCKHEIM, Hercule Eugene. (1790-1865). *A.*, Bull. Soc. d'Elbeuf, 9: 33-34, 1891; Swainson, W., B., Bib. of Zool., pp. 337-338, 1840; Locy, W. A., Story of Biol., pp. 268-271, 1925.
- STRECKER, (Ferdinand Heinrich) Herman. (1836-1901). *A.*, P., Ent. News, 13: 1-4, 1902; *A.*, P., Nat. Cyclop. Amer. Biog., 10: 317-318, 1909; Mengel, L. W., Can. Ent., 34: 25-26, 1902; Smith, J. B., P., Pop. Sci. Mo., 76: 472, 1910; Strecker, H., B., Butterflies and moths of N. A., pp. 275-277, 1878; Beutenmüller, W., Journ. N. Y. Ent. Soc., 9: 200, 1901; Osborn, H., P., Fragments Ent. Hist., 1937.
- STRETCH, Richard Harper. (1837-1923). Coolidge, K. R., et al., Ent. News, 31: 181-185, 1920; *A.*, Pan-Pacific Ent., 2: 160, 1926; Essig, E. O., B., P., Hist. of Ent., pp. 767-770, 1931; Osborn, H., Fragments Ent. Hist., p. 222, 1937.
- STRICKLAND, Hugh Edwin. (1811-1853). Jardine, W., et al., P., Biography. (Lond.), 1858.
- STRINGER, Richard. ( -1924). Vogel, G., Ent. Rundschau, 41: 28, 1924.
- STROBL, P. Gabriel. (1846-1925). Czerny, L., B., P., Konowia, 4: 376-381, 1925; Hedicke, H., Deutsche Ent. Ztschr., p. 250, 1925.
- STROHL, Jean. (1886-1942). *A.*, Mitt. Schweiz. Ent. Ges., 18: 531, 1943.
- STRÖM, Hans. (1726-1797). Henriksen, K. L., B., P., Ent. Meddel., 15: 74-76, 1922; Hagen, H., B., Stett. Ent. Zeit., 34: 225-232, 1873; Strand, E., B., Archiv Naturg., 83 A (6): 27-46, 1917.
- STRÖM, Vincens. (1818-1899). Henriksen, K. L., B., P., Ent. Meddel., 15: 185-186, 1925.
- STROMBERG, Charles W., (1856-1895). *A.*, Ent. News, 6: 172, 1895.
- STRONG, Lee Abram. (1886-1941). *A.*, Can. Ent., 73: 114-115, 1941; *A.*, Ent. News, 52: 187, 1941; *A.*, Science, 93: 563, 1941; *A.*, P., Journ. Econ. Ent., 34: 479-480, 1941; Hoyt, A. S., et al., B., P., Proc. Ent. Soc. Wash., 43: 156-166, 1941; *A.*, Ann. Ent. Soc. Amer., 35: 126-127, 1942; Osborn, H., P., Fragments Ent. Hist., p. 282, 1937.
- STUDER, Samuel. (1757-1834). *A.*, Verh. Schweiz. Naturf. Ges., pp. 83-93, 1835 (1836).
- STUDY, Edward. (1862-1930). Seitz, A., Rundschau, 47: 9, 1930.
- STURM, Jacob. (1771-1848). *A.*, Stett. Ent. Zeit., 10: 162-167, 1849; Swainson, W., B., Bib. of Zool., p. 338, 1840; "H. W.", P., Ent. Ztschr. Frankfurt, 47: 141, 1933; "S. M.", Rev. & Mag. Zool., (2) 2: 135-137, 1850.
- STURM, Johann Heinrich Christian Friedrich. (1805-1862). Herrich-Schaeffer, G. A. W., Correspondenzbl. Zool.-Min. Ver. Regensb., 16: 41-44, 1862; Hauck, J., Journ. Ornith., 10: 157-160, 1862.
- SUFFERT, Ernst. ( -1907). Schaufuss, C., Ent. Wochenbl., 24: 112, 1907; Horn, W., Deutsche Ent. Ztschr., p. 535, 1907.
- SUFFRIAN, Christian Wilhelm Ludwig Eduard. (1805-1876). Dohrn, C., B., Stett. Ent. Zeit., 38: 106-117, 1877; *A.*, B., Jahresh. Westfäl. Prov.-Ver., 5: 30-35, 1876.
- SULC, Karl. (1872-1932). Obenburger, J., B., P., Acta Soc. Ent. Cechosl., 29: 89-98, 1932.
- SULZER, Johann Heinrich. (1735-1813). Germar, E. F., Mag. Ent., 1 (2): 193, 1815.
- SUMMERS, John Nicholas. (1884-1941). Burgess, A. F., Ann. Ent. Soc. Amer., 35: 127, 1942; Burgess, A. F., P., Journ. Econ. Ent., 35: 294-295, 1942; *A.*, U. S. Dept. Agr. Bur. Ent. & Plant Quar. News Letter, 8 (12): 2, 1941.
- SUNDEVALL, Carl Jacob. (1801-1875). *A.*, Journ. Ornith., 23: 214-215, 1875; *A.*, Journ. Zool., 4: 61, 1875.
- SWAINSON, William. (1789-1855). Swainson, W., B., Bib. of Zool., pp. 338-352,

- 1840; Carvalho, A. de, B., Rev. Mus. Paulista, 10: 884-894, 1918; Musgrave, A., B., Bib. Austr. Ent., p. 307, 1932.
- SWALE, Harold. (1853-1919). Andrewes, H. E., Ent. Mo. Mag., 55: 140-141, 1919; A., Ent. News, 31: 30, 1920.
- SWAMMERDAM, Johann Jacob. (1637-1680). Pic, M., Echange, 30: 1-2 (sep, pag.), 1914; Stokvis, B. J., Album der Natuur, pp. 129-149, 1880; Jardine, W., Naturalist's Library, 28: 17-58, 1848; Hamet, H., L'Apiculteur, 2: 329-331, 1857-58; Buzairies, L. A., L'Apiculteur, 10: 210-215, 1865-66; A., Insecta, 2 (24): 2 pp. (unpaged), 1912; Harting, P., et al., P., Die Natur, 25: 165-168, 181-182, 202-204, 1876; Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., pp. 244-245, 1823; Locy, W. A., P., Story of Biol., pp. 240-250, 1925; Nordenskiöld, Erik, Hist. of Biol., pp. 167-171, 1935; Howard, L. O., P., Hist. Applied Ent., 1930.
- SWARTZ, Olaf. (1760-1818). A., B., Kongl. Vetensk. Acad. Handl. (Svensk), 39: 370-380, 1818.
- SWENK, Myron Harmon. (1883-1941). Calvert, P. P., Ent. News, 52: 240, 1941; A., Science, 94: 131, 1941; Tate, H. D., P., Journ. Econ. Ent., 34: 863-864, 1941; A., Ann. Ent. Soc. Amer., 35: 127, 1942; Osborn, H., P., Fragments Ent. Hist., p. 282, 1937.
- SWETT, Louis William. (1880-1930). Johnson, C. W., P., Psyche, 37: 300, 1930.
- SWINHOE, Charles. (1836-1923). A., Amer. Journ. Sci., (5) 7: 250, 1924; A., Ent. Mo. Mag., 60: 19-20, 1924; A., Ent. News, 35: 152, 1924; Walker, J. J., Nature, 113: 21, 1924; "B. D. J.", Proc. Linn. Soc. Lond., pp. 58-59, 1923-24; Riley, N. D., Entomologist, 57: 23-24, 1924; Musgrave, A., B., Bib. Austr. Ent., pp. 307-308, 1932; A., Journ. Bombay Nat. Hist. Soc., 29: 1042, 1924.
- SWYNNERTON, Charles Francis Massy. (1877-1938). Burkhill, I. H., Proc. Linn. Soc. Lond., pp. 254-256, 1938-39.
- SYKES, William Henry. (1790-1872). A., P., London Times, June 19, 1872; A., Proc. Roy. Soc. Lond., 20: xxxiii-xxxiv, 1872.
- SZEPLIGÉTI, Győző Viktor. (1855-1915). Viereck, H. L., 33: 61-62, 1922; Soldanski, H., Deutsche Ent. Ztschr., pp. 226-227, 1916; Musgrave, A., B., Bib. Austr. Ent., p. 309, 1932; Csiki, E., B., P., Rovartani Lapok, 22: 141-147, 193, 1915.
- TAIT, Robert. (1869-1939). Crabtree, B. H., Entomologist, 72: 152, 1939; A., Arb. morph. taxon. Ent. Berlin-Dahlem, 6: 349, 1939.
- TALLANT, W. N. (1856-1905). A., Ent. News, 16: 96, 1905; Osborn, H., Fragments Ent. Hist., p. 223, 1937.
- TANNER, Tanno Ruben. (1905-1940). A., Ann. Ent. Fenn., 6: 4-5, 6-7, 1940.
- TARBAT, James Edward. ( -1937). "St. E., W. G.", et al., Entomologist, 70: 96, 1937; A., Arb. morph. taxon. Ent., 4: 160, 1937.
- TARGIONI-TOZZETTI, Adolfo. (1823-1902). Fowler, W. W., Trans. Ent. Soc. Lond. (Proc.): lix-lx, 1902; Bargagli, P., et al., B., Bull. Soc. Ent. Ital., 34: 113-117, 199-233, 1902; Howard, L. O., P., Hist. of Applied Ent., 1930.
- TASCHENBERG, Ernst Ludwig. (1818-1898). A., Ent. News, 9: 80, 1898; A., Nature, 57: 300-301, 1898; Musgrave, A., B., Bib. Austr. Ent., p. 310, 1932; Howard, L. O., P., Hist. of Applied Ent., 1930.
- TASCHENBERG, Otto. (1854-1922). A., Ent. News, 33: 256, 1922; A., Wien. Ent. Zeit., 39: 112, 1922; Musgrave, A., B., Bib. Austr. Ent., p. 310, 1932.
- TAVARES, Joachim da Silva. (1866-1931). Luisier, A., B., P., Broteria, 28: 9-34, 1932; Navas, L., Bol. Soc. Ent. Espan., 14: 98-99, 1931.
- TAYLOR, Charlotte de Bernier. (1806-1867). A., P., Nat. Cyclop. Amer. Biog., 2: 164, 1899.
- TAYLOR, George William. (1851-1912). "J. F.", P., Ann. Rpt. Ent. Soc. Ont., 34: 108-109, 1903; "J. F.", P., Can. Ent., 36: 1-2, 1904; "T. W. F.", P., Can. Ent., 44: 285-287, 1912; Hanham, A. W., et al., Proc. B. C. Ent. Soc., 2: 1-4, 1912, (P. in vol. 1, 1911); Prince, E. E., Ottawa Nat., 26: 74-76, 1912.
- TAYLOR, John Kidson. (1839-1922). A., Ent. Mo. Mag., 59: 21, 1923.
- TENGSTRÖM, Johan Martin Jakob von. (1821-1890). Sahlberg, J., P., Ent. Tidskr.,

- 12: 177-190, 1891; *A.*, *Wien. Ent. Zeit.*, 10: 64, 1891; *A.*, *Ent. Mo. Mag.*, 27: 111-112, 1891.
- TENNSTEDT, Auguste. ( -1876). Fauvel, A., *Annuaire Ent.*, 4: 129, 1876.
- TEPPER, Johann Gottlieb Otto. (1841-1922). Howard, L. O., *Hist. of Applied Ent.*, pp. 393-394, 1930; *A.*, *So. Austr. Nat.*, 4 (2): 113, 1923; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 311-313, 1932.
- TERANISHI, Cho. (1896-1938). Tosawa, N., *P.*, *Trans. Kansai Ent. Soc. (Japan)*, 8: 2 pp., 1939; *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 6: 349, 1939.
- TERTTI, Martti. (1898-1940). *A.*, *Ann. Ent. Soc. Fenn.*, 6: 2-3 and 6, 1940.
- TERRY, Frank Wray. (1877-1911). Bueno, J. R. de la T., *Ent. News*, 23: 47-48, 1912; Morice, F. D., *Trans. Ent. Soc. Lond. (Proc.)*: cxxvii, 1911; *A.*, *Proc. Haw. Ent. Soc.*, 2: 189, 1912; Musgrave, A., *B.*, *Bib. Austr. Ent.*, p. 313, 1932.
- THAXTER, Rowland. (1858-1932). Clinton, G. P., *B.*, *P.*, *Nat. Acad. Sci. Biog. Mem.* 17 (3): 55-68, 1937.
- THEOBALD, Frederic Vincent. (1868-1930). Laing, F., *P.*, *Ent. Mo. Mag.*, 66: 92-93, 1930; Edwards, F. W., *Entomologist*, 63: 95-96, 1930; Jordan, K., *Proc. Ent. Soc. Lond.*, 5: 132, 1931; Howard, L. O., *P.*, *Hist. of Applied Ent.*, pp. 222-223, 1930; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 313-314, 1932.
- THEOPHRASTUS, Eresius. (372-288 B.C.). Locy, W. A., *P.*, *Story of Biol.*, pp. 34-38, 1925.
- THIENE, Otto. (1837-1907). Röhmer, R., *P.*, *Ent. Wochenbl.*, 24: 143, 1907; Ziegler, F., *B.*, *Berlin. Ent. Ztschr.*, 52: 114-116, 1907; Horn, W., *Deutsche Ent. Ztschr.*, p. 534, 1907; *A.*, *Leopoldina*, 43: 79, 1907.
- THOMAS, Cyrus. (1825-1910). *A.*, *Nat. Cyclop. Amer. Biog.*, 13: 528-529, 1906; Forbes, S. A., *Journ. Econ. Ent.*, 3: 383-384, 1910; Rehn, J. A. G., *Ent. News*, 21: 387-388, 1910; Goding, F. W., *Ill. Hort. Soc.*, 22: 106-108, 1888; *A.*, *Science*, 32: 53, 1910; Howard, L. O., *P.*, *Hist. Applied Ent.*, 1930; Essig, E. O., *P.*, *Hist. of Ent.*, pp. 770-772, 1931; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 140, 1937.
- THOMAS, Joseph. (1820-1908). *A.*, *Ent. News*, 19: 142, 1908.
- THOMAS, Lancaster. (1838-1910). *A.*, *Ent. News*, 21: 290, 1910.
- THOMPSON, Caroline Burling. (1869-1921). Calvert, P. P., *B.*, *Ent. News*, 33: 62-63, 1922; "T. E. S.", *Science*, 55: 40-41, 1922.
- THOMPSON, William. (1805-1852). Westwood, J. O., *Trans. Ent. Soc. Lond.*, (2) 2 (Proc.): 50-51, 1852-53.
- THOMSON, Carl Gustav. (1824-1899). *A.*, *Leopoldina*, 35: 183, 1899; Bengtsson, S., *B.*, *P.*, *Ent. Tidskr.*, 21: 1-16, 1900; *A.*, *Ent. Mo. Mag.*, 35: 276, 1899; *A.*, *Bull. Soc. Ent. France*, p. 329, 1899; *A.*, *Deutsche Ent. Ztschr.*, 43: 7, 1899; Kraatz, G., *Deutsche Ent. Ztschr.*, 44: 223, 1900; Mik, J., *Wien. Ent. Zeit.*, 19: 88, 1900; Musgrave, A., *Bib. Austr. Ent.*, p. 316, 1932.
- THOMSON, George Malcolm. (1848-1935). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 3: 64, 1936.
- THOMSON, James. ( -1897). *A.*, *Bull. Soc. Ent. France*, p. 305, 1897; *A.*, *Ent. Mo. Mag.*, 34: 68, 1898; Bouvier, E. L., *Bull. Soc. Ent. France*, p. 5, 1898; Kraatz, G., *Deutsche Ent. Ztschr.*, 42: 9, 1898; Trimen, R., *Trans. Ent. Soc. Lond. (Proc.)*: liv, 1898; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 314-316, 1932.
- THON, Karl. (1879-1906). Korschelt, E., et al., *B.*, *Verh. Deutsch. Zool. Ges.*, 17: 20, 1907.
- THOR, Sigmund. (1856-1937). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 5: 186, 1938; "T. H. S.", *Norsk Ent. Tidsskrift*, 5: 41-42, 1938.
- THOREAU, Henry David. (1817-1862). Allen, F. H., *B.*, *P.*, *Houghton*, 201 pp., 1908; Bazalgette, L., *Harcourt*, 357 pp., 1924; Channing, W. E., *Goodspeed*, 397 pp., 1902; Emerson, R. W., *Thoreau's Miscellanies*, *Riverside ed.*, pp. 1-33, 1893; Hubbard, E., *P.*, *Little journeys to the homes of great philosophers*, pp. 153-189, 1904; Japp, A. H., *P.*, *Bentley*, 271 pp., 1878; Marble, A. R., *P.*, *Crowell*, 343 pp., 1902; Salt, H. S., *P.*, *Bentley*, 315 pp., 1890; Sanborn, F. B., *P.*, *Houghton*, 324 pp., 1882; Sanborn, F. B., *P.*, *Houghton*, 542 pp., 1917; Wade, J. S., *Journ. N. Y. Ent. Soc.*, 35: 1-21, 1927; Wade, J. S., *P.*, *Nature Mag.*, 10:

- 53-54, 1927; Wade, J. S., *Sci. Mo.*, 23: 152-160, 1926; Wade, J. S., *B.*, *Journ. N. Y. Ent. Soc.*, 47: 163-203, 1939.
- THORN, Leonard B. (1891-1924). *A.*, *Vict. Nat.*, 41: 124-125, 1924; Musgrave, A., *B.*, *Bib. Austr. Ent.*, p. 316, 1932.
- THORNEWELL, Charles Francis. (1840-1929). Walker, J. J., *Ent. Mo. Mag.*, 65: 263-264, 1939.
- THUNBERG, Carl Peter. (1743-1828). Strecker, H., *B.*, *Butterflies and moths of N. A.*, p. 277, 1878; Hagen, H., *Stett. Ent. Zeit.*, 18: 5-12, 200-204, 1857; *A. B.*, *Vetensk. Acad. Handl.* 1828, pp. 242-267, 1829; Fée, A. L. A., *Mem. Soc. Sci. Lille*, 1: 196-219, 1831 (1832); Duméril, A. M. C., *Consid. Gén. sur la Classe des Ins.*, p. 258, 1823; Hagen, H., *B.*, *Bib. Ent.*, 2: 219-222, 1863; Musgrave, A., *Bib. Austr. Ent.*, p. 316, 1932.
- THURNALL, Alfred. (1858-1929). Sheldon, W. G., *Entomologist*, 62: 192, 1929.
- THWAITES, George Henry Kendrick. (1811-1882). *A.*, *Ent. Mo. Mag.*, 19: 142-143, 1882; *A.*, *Leopoldina*, 18: 209, 1882.
- TIEFFENBACH, H. (1820-1892). Kraatz, G., *Deutsche Ent. Ztschr.*, 36: 12-13, 1892.
- TILLYARD, Robin John. (1881-1937). *A.*, *Ent. News*, 48: 42, 1937; *A.*, *Can. Ent.*, 69: 71, 1937; *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 4: 161, 1937; Dunbar, C. O., *Amer. Journ. Sci.*, 33: 317-318, 1937; Imms, A. D., *Journ. Econ. Ent.*, 31: 135-136, 1938; Imms, A. D., *P.*, *Obit notices Roy. Ent. Soc. Lond.*, 2: 339-345, 1938; Imms, A. D., *Proc. Roy. Ent. Soc. Lond.*, (C) 1: 56, 1937; Imms, A. D., *Proc. Roy. Ent. Soc. Lond.*, (C) 2: 62-63, 1938; Carpenter, G. D. H., *Proc. Linn. Soc. Lond.*, pp. 212-218, 1936-37; Lestage, J. A., *Bull. & Ann. Soc. Ent. Belg.*, 77: 259-260, 1937; Howard, L. O., *P.*, *Hist. of Applied Ent.*, pp. 383, 309-401, 1930; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 316-321, 1932; "S. S.", *Norsk Ent. Tidsskrift*, 5: 42, 1938.
- TISCHER, Carl Friedrich August von. (1777-1849). *A.*, *Stett. Ent. Zeit.*, 11: 32, 1850.
- TÖLG, Franz. (1878-1917). Heikertinger, F., *Ent. Blätter*, 13: 42, 1917; Heikertinger, F., *B.*, *P.*, *Wien. Ent. Zeit.*, 36: 117-120, 1917; Heikertinger, F., *B.*, *Ztschr. Angew. Ent.*, 4: 184-186, 1917.
- TÖMÖSVÁRY, Ödön. (1852-1884). Otto, H., *B.*, *P.*, *Rovartini Lapok*, 2 (1): 1-14, 1885; Mik, J., et al., *Wien. Ent. Zeit.*, 3: 288, 1884.
- TONGE, Alfred Ernest. (1869-1939). Blair, K. G., *Ent. Mo. Mag.*, 75: 203, 1939.
- TONNOIR, André Léon. (1885-1940). Edwards, F. W., *P.*, *Ent. Mo. Mag.*, 76: 118-120, 1940; *A.*, *Bull. & Ann. Soc. Ent. Belg.*, 80: 87, 1940; Nicholson, A. J., *Nature*, 145: 453-454, 1940; *A.*, *Proc. Linn. Soc. N. S. Wales*, 65: ii, 1940; Musgrave, A., *B.*, *Bib. Austr. Ent.*, p. 322, 1932.
- TORRE E TASSO, Alessandro Carlo della. (1881-1937). *A.*, *P.*, *Mus. Ent. Pietro Rossi Duino*, no. 2: v-xi, 1937.
- TOSQUINET, Pierre Jules. (1824-1902). *A.*, *Can. Ent.*, 35: 2, 1903; *A.*, *Ent. Mo. Mag.*, 38: 289, 1902; Fowler, W. W., *Trans. Ent. Soc. Lond. (Proc.)*, lix, 1902; Severin, G., *B.*, *P.*, *Mem. Soc. Ent. Belg.*, 10: 1-12, 1903; Henneguy, F., *Bull. Soc. Ent. France*, p. 277, 1902; *A.*, *Wien. Ent. Zeit.*, 21: 270, 1902; *A.*, *Rev. Russe Ent.*, 3: 68, 1903; Kraatz, G., *Deutsche Ent. Ztschr.*, 47: 176, 1903.
- TREAT, Mary Lua Adelia (Davis) Allen. (1835- ). Howard, L. O., *P.*, *Hist. Applied Ent.*, pp. 22-23, 1930.
- TREFFERY, Joseph Eveleigh. ( -1900). "T. W. F.", *Ann. Rpt. Ent. Soc. Ont.*, 31: 105, 1900.
- TREHERNE, Reginald Charles. (1886-1924). Dean, G. A., et al., *Journ. Econ. Ent.*, 17: 506-508, 1924; Gibson, A., et al., (*B.* by H. G. Crawford), *Can. Ent.*, 56: 151-153, 1924; "R. G.", *Proc. Ent. Soc. B. C.*, 21: 45, 1924 (*P.* in *Syst. Ser.* 12: 1, 1918); Osborn, H., *Fragments Ent. Hist.*, pp. 210-211, 1937.
- TREMBLEY, Abraham. (1700-1784). Miall, L. C., *Early naturalists, their lives and work*, pp. 279-284, 1912; Locy, W. A., *Story of Biol.*, pp. 277-282, 1925; Nordenskiöld, Erik, *Hist. of Biol.*, pp. 232-233, 1935.
- TRENTPOHL, Johann Jacob. (180?-1830). Henriksen, K. L., *B.*, *Ent. Meddel.*, 15: 201, 1926. (According to Hagen, H., *Bib. Ent.*, 2: 227 1863, (1776-1837).
- TREUGE, Emil. (1836-1876). *A.*, *Jahresb. Westfäl. Prov.-Ver.*, 5: 35-37, 1876.



- TREVIRANUS, Gottfried Reinhold. (1776-1837). Focke, W. O., Abhandl. Naturf. Ver. Bremen, 6: 11-48, 1879.
- TREVIRANUS, Ludolph Christian. (1779-1864). *A.*, *B.*, Sitzb. Bayer. Akad. Wiss. München, pp. 264-287, 1865.
- TRIMBLE, Isaac Pim. (1802-1889). Johnson, W. G., Proc. Ent. Soc. Wash., 4: 230-233, 1901; Weiss, H. B., *B.*, Ent. News, 29: 29-32, 1918.
- TRIMEN, Roland. (1840-1916). *A.*, Ent. News, 28: 338, 1917; *A.*, Ent. Mo. Mag., 52: 209-210, 1916; Bethune-Baker, G. T., Ent. Record, 28: 231-236, 1916; Rowland-Brown, H., Entomologist, 49: 240, 1916.
- TRISTÁN, José Fidel. (1874-1932). Calvert, P. P., *P.*, Ent. News, 43: 197-200, 1932.
- TROOP, James. (1853-1941). Davis, J. J., Science, 94: 507, 1941; *A.*, Ent. News, 53: 21, 1942; Davis, J. J., *P.*, Journ. Econ. Ent. 34: 865-866, 1941; Davis, J. J., Ann. Ent. Soc. Amer., 35: 127-128, 1942.
- TROOST, Gerard. (1776-1850). Ruschenberger, W. S. W., Notice origin, progress etc. Acad. Phila., pp. 55-57, 1852, pp. 74-77, 1860; Youmans, W. J., *P.*, Pioneers of science in America, pp. 119-127, 1896.
- TROSCHER, Franz Hermann. (1810-1882). *A.*, Amer. Nat., 17: 116, 1883; *A.*, Zool. Anzeiger, 5: 644, 1882; *A.*, Leopoldina, 18: 209-210, 1882.
- TROUESSART, Édouard Louis. (1842-1927). Bourdelle, E., *B.*, *P.*, Arch. Mus. Hist. Nat. (Paris), (6) 3: 1-18, 1928; Porter, C. E., Rev. Chilena Hist. Nat., 32: 394, 1928.
- TRUMAN, Philetus Clark. (1841-1901). *A.*, Ent. News, 12: 327-328, 1901.
- TRYBORN, Filip. (1850-1913). *A.*, Ent. News, 26: 240, 1915; Aurivillius, C., *B.*, *P.*, Ent. Tidskr., 35: 81-86, 1914.
- TSCHITSCHÉRINE, Tichon Sergeiewitsch. (1869-1904). Semenov-Tian-Shansky, A., *B.*, *P.*, Horae Soc. Ent. Ross., 38 (4): 1-36, list of insects described pp. 37-45, 1908; Jacobson, G. G., Ann. Mus. St. Petersburg, 9: xxxii, 1904; Semenov, A., *P.*, Rev. Russe Ent., 4: 69-76, 1904; Musgrave, A., *B.*, Bib. Austr. Ent., p. 326, 1932.
- TUELY, N. C. ( -1878). Bates, H. W., Trans. Ent. Soc. Lond. (Proc.): lxxi, 1878.
- TUGWELL, William Henry. (1831-1895). *A.*, Ent. News, 7: 64, 1896; *A.*, Ent. Mo. Mag., 31: 243, 1895; *A.*, Ent. Record, 7: 72, 1895; Adkin, R., Entomologist, 28: 315-316, 1895; *A.*, Leopoldina, 32: 56, 1896.
- TULLBERG, Tycho Fredrik Hugo. (1842-1920). Wallgren, E., *P.*, Ent. Tidskr., 42: 60-64, 1921.
- TURATI, Emilio. (1858-1938). *A.*, Boll. Soc. Ent. Ital., 70: 129, 1938; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 6: 69, 1939; *A.*, Bull. & Ann. Soc. Ent. Belg., 79: 31, 1939; Taccani, C., *B.*, *P.*, Mem. Soc. Ent. Ital., 17: 257-262, 1939; Oberthür, C., *P.*, Études Léop. Comp. 10 (plates): unpagged, 1915; "H. Th.", Mitt. Schweiz. Ent. Ges., 17: 472-473, 1939; Mariani, M., *B.*, *P.*, Folio Zool. & Hydrobiol., 9: 314-316, 1939.
- TÜRCKHEIM, Hans von. (1814-1892). Kraatz, G., Deutsche Ent. Ztschr., 37: 12, 1893; Honrath, E. G., Berlin Ent. Ztschr., 37: 511-512, 1892.
- TURNER, Charles Henry. (1867-1923). Pohlman, A. G., *P.* (B. by P. Rau), Trans. Acad. Sci. St. Louis, 29 (9): 1-54, 1923; Rau, P., *P.*, Ent. News, 34: 289-292, 1923; Osborn, H., *P.*, Fragments Ent. Hist., p. 202, 1937.
- TURNER, James Aspinall. (1797-1867). Weiss, H. B., Can. Ent., 287-289, 1926; *A.*, Ent. Mo. Mag., 4: 141, 1867-68.
- TURNER, John Patillo. (1902-1940). *A.*, Ent. News, 52: 30, 1940.
- TUTT, James William. (1858-1911). *A.*, Ent. Mo. Mag., 47: 70-72, 1911; *A.*, Ent. News, 22: 191-192, 1911; Turner, J., et al., Ent. Record, 23: 105-139, 1911; Chapman, T. A., Entomologist, 44: 77-80, 1911.
- TYL, Heinrich. ( -1918). *A.*, Wien. Ent. Zeit., 37: 178, 1918.
- TYZENHAUS, Constantin. (1786-1853). Adamowicz, A. F., *B.*, Bull. Soc. Imp. Nat. Moscou, 26 (2): 517-529, 1853.
- UDEKEM, Gérard Jules Marie Ghislain d'. (1824-1864). Lambotte, H., Ann. Soc.

- Malacol. Belg. 1 (Bull.): lxxiii-lxxiv, 1863-65; Quetelet, A., Ann. Acad. Belg., 31: 127-130, 1865.
- UHLER, Philip Reese. (1835-1913). *A.*, Nat. Cyclop. Amer. Biog., 8: 251, 1900; Henshaw, S., Psyche, 10: 31-42, 85-92, 122-124, 224-238, 1903; Howard, L. O., *P.*, Ent. News, 24: 433-439, 1913; Schwarz, E. A., et al., *B.*, *P.*, Proc. Ent. Soc. Wash., 16: 1-7, 1914; Wade, J. S., Proc. Ent. Soc. Wash., 38: 138, 1936; Champion, G. C., Ent. Mo. Mag., 50: 43, 1914; Essig, E. O., *B.*, *P.*, Hist. of Ent., pp. 773-775, 1931; Osborn, H., *P.*, Fragments Ent. Hist., pp. 168-170, 1937.
- UHRYK, Ferdinand. ( -1909). Lösy, J., *B.*, Rovartini Lapok, 17: 145-147, 160, 1910.
- UJHELYI, Joseph. (1882-1935). "W. F. S.", Journ. Econ. Ent., 29: 226-227, 1936.
- ULE, Otto Eduard Vincenz. (1820-1876). *A.*, Zool. Garten, 17: 344, 1876; "K. M.", *P.*, Die Natur, 25: 405-406, 416-417, 431-432, 442-443, 1876.
- ULKE, Henry. (1821-1910). *A.*, *P.*, Ent. News, 21: 99-100, 1910; Banks, N., et al., *B.*, *P.*, Proc. Ent. Soc. Wash., 12: 105-111, 1910; Hopkins, A. D., et al., Ann. Ent. Soc. Amer., 5: 74, 1912; Fairman, C. E., Arts and artists in the Capitol of the U. S. of America 69 Cong., 1st Sess. Sen. Doc. no. 95, p. 356, 1927; Osborn, H., *P.*, Fragments Ent. Hist., p. 231, 1937.
- UNGER, Franz. (1800-1870). Leitgeb, H., *B.*, *P.*, Mitt. Naturw. Ver. Steiermark, 2: 270-294, cxlvii-cliv, 1870; Hauer, F. von, Verh. Geol. Reichanstalt Wien, pp. 57-58, 1870; Burgerstein, A., *P.*, Bot. & Zool. in Oestrr. 1850-1900 Festchr., pp. 235-237, 1901; Kobell, F. von, Sitzb. Bayr. Akad. Wissen. München, Jan.-May, pp. 420-423, 1870.
- UNWIN, William Charles. (1811-1887). *A.*, Ent. Mo. Mag., 24: 47, 1887.
- URICH, Frederick William. (1870-1937). Busck, A., Proc. Ent. Soc. Wash., 39: 192-193, 1937; Wolcott, G. N., Journ. Econ. Ent., 31: 326, 1938; Imms, A. D., Proc. Roy. Ent. Soc. Lond., (C) 2: 63, 1937; Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- UZEL, Jindrich. (1868-1938). Šámal, J., Acta Soc. Ent. Cechosl., 35: 4-5, 1938; Howard, L. O., *P.*, Hist. of Applied Ent., 1930.
- UZELLE, Théophile Bruand de. (1808-1861). Millièrre, P., *B.*, Ann. Soc. Ent. France, (4) 1: 651-656, 1861.
- VACHAL, Joseph. (1838-1911). Buysson R. du, *B.*, *P.*, Ann. Soc. Ent. France, 82: 778-784, 1913; Musgrave, A., Bib. Austr. Ent., p. 332, 1932; Janet, A., Bull. Soc. Ent. France, p. 41, 1911; Kuhnt, P., Deutsche Ent. Ztschr., pp. 353-354, 1911; Semenov-Tian-Shanskij, A., Rev. Russe Ent., 12: 637, 1912; *A.*, Miscellanea Ent., 19 (3): 28, 1911.
- VAHERI, Erkki Benjamin. (1907-1940). *A.*, Ann. Ent. Fenn., 6 (1-2): 5 and 7, 1940.
- VAILLANT, Maréchal. ( -1872). *A.*, Pet. Nouv. Ent., 4: 216, 1872.
- VALENCIENNES, Achille. (1794-1865). *A.*, Amer. Journ. Sci., (2) 40: 140, 1865; "J. v. d. H.", Nederl. Tidschr. Dierkunde, 3: 71-72, 1866; Vibraye, P. de, Mem. Agr. Econ. Rurale & Domest. (Paris), 1867, pp. 45-59, 1868.
- VALLINIERI, Antonio. (1661-1730). Duméril, A. M. C., Consid. Gén. sur la Classe des Ins., pp. 246-247, 1823; Howard, L. O., *P.*, Hist. Applied Ent., 1930.
- VAN DER HOEVEN, Jan. (1801-1868). Harting, P., *B.*, Jaarb. Konink. Akad. Wetensch., pp. 1-34, 1868.
- VAN DER WEELE, Herman Willem. (1879-1910). Everts, E., *B.*, *P.*, Tidschr. Ent., 54: 1-5, 1911; Selys Longchamps, E. de, *B.*, Coll. Zool. Selys Longchamps, Libellulines, 2 (12): 2 pp. unpag., 1911.
- VAN DER WULP, Frederick Maurits. (See under WULP).
- VAN DUZEE, Edward Payson. (1861-1940). Usinger, R. L., Pan-Pacific Ent., 16: 123, 1940; Essig, E. O., et al., *B.*, *P.*, Pan-Pacific Ent., 16: 145-177, 1941; MacFarland, F. M., Science, 92: 99, 1940; Essig, E. O., Ann. Ent. Soc. Amer., 34: 263, 1941; Torre-Bueno, J. R. de la, *P.*, Bull. Bklyn. Ent. Soc. 36: 80-81, 1941; *A.*, Ent. News, 51: 240, 1940; Gunther, J. D., *P.*, Ent. News, 40: 103-104, 1929; *A.*, Journ. Econ. Ent., 33: 711, 1940; *A.*, Amer. Men of Science, p. 1144, 1933; Osborn, H., *P.* (pl. 5), Frag. of Ent. Hist., p. 234, 1937.

- VAN DUZEE, Millard Carr. (1860-1934). Hungerford, H. B., *Ann. Ent. Soc. Amer.*, 28: 179-180, 1935; *A., Ent. News*, 45: 202, 1934; Van Duzee, E. P., *B., P., Pan-Pacific Ent.*, 10: 90-96, 1934; Osborn, H., *Fragments Ent. Hist.*, p. 229, 1937.
- VAUGHAN, Howard W. J. (1846-1892). "C. A. B.", *Entomologist*, 25: 300, 1892; *A., Ent. Mo. Mag.*, 28: 291-292, 1892.
- VAULOGER DE BEAUPRÉ, Marcel. ( -1904). Lévêille, A., *Bull. Soc. Ent. France*, p. 125, 1904; "A. C.", *Rev. Russe Ent.*, 4: 253, 1904.
- VÉCSEY, Stefan. (Istvan). (1863-1910). Schmidt, A., *P., Rovartani Lapok*, 18: 97-99, 112, 1911.
- VENUS, Carl Eduard. (1816-1889). Staudinger, O., *Iris*, 2: 278-279, 1889.
- VERLAINE, Louis. (1889-1939). *A., Bull. & Ann. Soc. Ent. Belg.*, 79: 231, 1939.
- VERRALL, George Henry. (1848-1911). *A., Ent. News*, 23: 48, 1912; Porritt, G. T., *P., Ent. Mo. Mag.*, 47: 262-264, 1911; Rowland-Brown, H., *P., Entomologist*, 44: 329-332, 1911; Turner, H. J. T., *Ent. Record*, 23: 284, 1911; Morice, F. D., *Trans. Ent. Soc. Lond. (Proc.)*: cxxiv-cxxvi, 1911; *A., Cent. Hist. Ent. Soc. Lond.*, pp. 151-152, 1933.
- VERRILL, Addison Emory. (1839-1927). *A., P., Nat. Cyclop. Amer. Biog.*, 3: 100-101, 1893; Osborn, H., *P., Fragments Ent. Hist.*, pp. 172-173, 1937.
- VIBERT, Léon. (1863-1914). *A., Ent. News*, 26: 192, 1915; Alluaud, C., *Bull. Soc. Ent. France*, p. 435, 1914; *A., Miscellanea Ent.*, 22 (10): 50, 1915.
- VICKERY, Roy Albion. (1884-1938). Snapp, O. I., *P., Journ. Econ. Ent.*, 31: 637, 1938.
- VIDGHAL'M, Ighnati Martinovich. (1835-1903). Shugarov, A. M., *Rev. Russe Ent.*, 3: 421, 1903.
- VIERECK, Henry Lorenz. (1881-1931). Rehn, J. A. G., *P., Ent. News*, 43: 141-148, 1932; Davis, J. J., *Ann. Ent. Soc. Amer.*, 25: 251, 1932; Musgrave, Bib. Austr. Ent., p. 333, 1932; *A., Journ. Econ. Ent.*, 25: 150, 1932; Osborn, H., *P., Fragments Ent. Hist.*, p. 238, 1937.
- VIGELIUS, Ludwig Christian. (1797-1857). Thomä, C., *Jahrb. Ver. Naturk. Nassau*, 12: 424-437, 1857.
- VILLA, Antonio. ( -1885). Dimmock, G., *Psyche*, 5: 36, 1888; *A., B. only*, *Bull. Soc. Ent. Ital.*, 2: 214-216, 1870; Stoppani, A., *Atti Soc. Ital. Sci. Nat. Milano*, 28: 138-141, 1885; Howard, L. O., *P., Hist. of Applied Ent.*, 1930.
- VILLERS, Charles Joseph de. (1724-1810). Swainson, W., *Bib. of Zool.*, pp. 365-366, 1840; Mulsant, E., *B., Ann. Soc. Agr. Lyon*, 3: 243-253, 1840.
- VILLIERS, Francois de. (1790-1847). Guénee, A., *Ann. Soc. Ent. France*, (2) 5: 619-624, 1847.
- VIMMER, Anton. (1864-1934). Obenberger, J., *Acta Soc. Ent. Cechosl.*, 31: 97-98, 1934.
- VINAL, Stuart Cunningham. (1895-1918). *A., Ent. News*, 29: 400, 1918; *A., B., Journ. Econ. Ent.*, 11: 437, 1918; *A., Science*, 48: 443, 1918.
- VINOGRADOV- NIKITIN, Pavel Zacharovitsch. (1869-1938). *A., Arb. morph. taxon. Ent. Berlin-Dahlem*, 6: 69, 1939.
- VITZTHUM, Anton. ( - ). Kirsten, G., *Eichstädt. Bienen-Zeit.*, 1: 5-7, 1845.
- VOGEL, F. (1860- ). *A., Ent. News*, 26: 240, 1915; *A., Ent. Blätter*, 11: 64, 1915.
- VOGEL, Hermann Karl. (1842-1907). Schaufuss, C., *Ent. Wochenbl.*, 24: 148-149, 1907; Horn, W., *Deutsche Ent. Ztschr.*, p. 591, 1907.
- VOGT, Carl Christoph. (1817-1895). Taschenberg, O., *B., Leopoldina*, 56: 10-12, 18-24, 51-54, 57-62, 73-74, 1902, *l. c.* 57: 24, 1921; Nordenskiöld, Erik, *Hist. of Biol.*, pp. 451-452, 1935.
- VOLCK, William Hunter. (1879-1943). Essig, E. O., *P., Journ. Econ. Ent.*, 36: 484-486, 1943.
- VOLLENHOVEN, Samuel Constant Snellen van. (1816-1880). Van der Wulp, F. M., *B., P., Tidschr. Ent.*, 24: lxxxix-cviii, 1880; Dohrn, C. A., *Stett. Ent. Zeit.*, 41: 249, 1880; Roelofs, W., *Ann. Soc. Ent. Belg.*, 23: xlv-xlvi, 1880; "I. O. W.", *Ent. Mo. Mag.*, 16: 279-280, 1880; *A., Ent. Nachr.*, 6: 147, 1880; May, J. W., *Entomologist*, 13: 117-118, 1880; Kraatz, G., *Deutsche Ent. Ztschr.*, 24: 238,

- 1880; *A.*, *Nature*, 21: 538-539, 1880; *A.*, *Amer. Nat.*, 14: 468, 1880; *A.*, *Zool. Anzeiger*, 3: 192, 1880; *A.*, *Naturaliste*, 2: 208, 1880; *A.*, *Leopoldina*, 16: 95, 1880; Dohrn, C. A., *Stett. Ent. Zeit.*, 42: 371-375, 1881; Musgrave, A., *Bib. Austr. Ent.*, p. 333, 1932.
- VORBRODT, Karl. (1864-1932). Wehrli, E., *B.*, *Mitt. Schweiz. Ent. Ges.*, 15: 421-424, 1933; *A.*, *Ent. Record*, 45: 142, 1933; Goltz, H. von, *P.*, *Ent. Ztschr. (Frankfurt)*, 46: 201-204, 1933.
- VORIS, Ralph. (1902-1940). *A.*, *Ent. News*, 51: 210, 1940; *A.*, *Science*, 91: 539, 1940; Kinsey, A. C., *Ann. Ent. Soc. Amer.*, 34: 263-264, 1941.
- VOSLER, Everett Jay. (1890-1918). Smith, H. S., *Journ. Econ. Ent.*, 11: 485-486, 1918; Smith, H. S., *P.*, *Calif. Mo. Bull. St. Comm. Hort.*, 7: unpagged, 1918; Essig, E. O., *B.*, *P.*, *Hist. of Ent.*, pp. 776-777, 1931.
- VOSNESENSKY, Ilya Gavrilovich. (1816-1871). Essig, E. O., *P.*, *Hist. of Ent.*, pp. 777-789, 1931.
- VOUAUX, L. (—1914). Berland, L., *Ann. Soc. Ent. France*, 89: 432-434, 1920; *A.*, *Miscellanea Ent.*, 22 (11): 60, 1915.
- VROLIK, Gerardus. (1775-1859). Van der Hoeven, J., *B.*, *Jaarb. Akad. Wetensch. Amsterdam*, pp. 116-134, 1859.
- VRZAL, Anton. (1892-1935). Roubal, J., *Acta Soc. Ent. Cechosl.*, 32: 146, 1935.
- VUILLET, Andre. (1883-1914). Berland, L., *P.*, *Ann. Soc. Ent. France*, 89: 434-436, 1920; Marchal, P., *B.*, *Ann. Epiphyt.*, 6: 1-4, 1919; *A.*, *Science*, 41: 91, 1915.
- WACHANRU, Marie Rose Gaudemard. (1821-1853). Mulsant, E., *Ann. Soc. Linn. Lyon*, 1: 353-362, 1853.
- WACHSMANN, Franz (Ferencz). (1837-1911). Csiki, E., *P.*, *Rovart. Lapok. (Hungary)*, 18: 81-84, 1911.
- WACHTL, Friedrich A. (Fritz). (1840-1913). *A.*, *Ent. News*, 24: 432, 1913; Reitter, E., *B.*, *Ent. Blätter*, 9: 201-203, 1913; Reitter, E., *B.*, *Wien. Ent. Zeit.*, 32: 187-189, 1913.
- WAGA, Anton. (1799-1890). Mabille, P., *Ann. Soc. Ent. France*, (6) 10 (Bull.): ccxi, 1890; *A.*, *Nature*, 43: 131, 1890; Larousse, P., *Grand Diet. Univ. du XIX Siècle*, 15: 1243, 1876.
- WAGENER, Guido Richard. (1822-1896). Gurlt, E., *Archiv Path. Anat. (Berlin)*, 148: 180, 1897; *A.*, *Leopoldina*, 32: 59, 1896.
- WAGNER, Fritz. (1873-1938). *A.*, *Arb. morph. taxon. Ent. Berlin-Dahlem*, 5: 296, 1938; Lindner, E., *P.*, *Konowia*, 17: 1-4, 1938.
- WAGNER, Nicolai Petrowitsch. (1829-1907). Schauffuss, C., *Ent. Wochenbl.*, 24: 85, 1907; *A.*, *Leopoldina*, 43: 64, 1907.
- WAGNER, Rudolph. (1805-1864). *A.*, *Amer. Journ. Sci.*, (2) 38: 149, 1864; *A.*, *Sitzb. Bayer. Akad. Wiss. München*, pp. 287-294, 1865; Wagner, A., *Nachr. Ges. Wiss. Göttingen*, pp. 375-399, 1864; Nordenskiöld, Erik, *Hist. of Biol.*, pp. 450-451, 1935.
- WAHNSCHAFTE, Max. (1823-1884). Kraatz, G., *Deutsche Ent. Ztschr.*, 28: 439-440, 1884.
- WAILES, George. (1802-1882). Stainton, H. T., *Ent. Mo. Mag.*, 19: 211-212, 1883.
- WALCKENAER, Charles Athanase. (1771-1852). Westwood, J. O., *B.*, *Trans. Ent. Soc. Lond.*, (2) 2 (Proc.): 51-53, 1853.
- WALKER, Francis. (1809-1874). *A.*, *Can. Ent.*, 6: 220, 1874; Carrington, J. T., *Ent. Mo. Mag.*, 11: 140-141, 1874; Newman, E., *Ann. Rpt. Ent. Soc. Ont.*, 6: 22-24, 1875; Newman, E., *Can. Ent.*, 255-259, 1874; Newman, E., *P.*, *Distant's Insecta Transvaaliensis*, p. 197, 1907; Strecker, H., *B.*, *Butterflies and moths of N. A.*, p. 278, 1878; Swainson, W., *Bib. of Zool.*, p. 386, 1840; *A.*, *Nat. Can.*, 7: 184, 1875; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 334-336, 1932; *A.*, *Pet. Nouv. Ent.*, 6: 453, 1874; Essig, E. O., *P.*, *Hist. of Ent.*, pp. 789-790, 1931; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 28, 1937.
- WALKER, Francis Augustus. (1841-1905). *A.*, *Ent. Mo. Mag.*, 41: 97, 1905.
- WALKER, James John. (1851-1939). Poulton, E. B., *B.*, *P.*, *Ent. Mo. Mag.*, 75: 64-

- 70, 77-79, 1939; Blair, K. G., *Entomologist*, 72: 48, 1939; *A.*, *Arb. morph. taxon.* Ent. Berlin-Dahlem, 6: 188, 1939; *A.*, *Indian Journ. Ent.*, 1: 128, 1939; Usinger, R. L., *Pan-Pacific Ent.*, 16: 12, 1940; Carpenter, G. D. H., *Proc. Linn. Soc. Lond.*, pp. 260-262, 1938-39; Musgrave, B. only, *Bib. Austr. Ent.*, pp. 336-337, 1932.
- WALLACE, Alexander. (1829-1899). *A.*, *Ent. Mo. Mag.*, 35: 275-276, 1899; *A.*, *Entomologist*, 32: 312, 1899.
- WALLACE, Alfred Russel. (1823-1913). *A.*, *Ent. News*, 24: 480, 1913; *A.*, *Ent. News*, 25: 34-37, 1914; Bethune-Baker, G. T., *Trans. Ent. Soc. Lond.*, (Proc.): cxlii, 1913; Turner, H. J., *Ent. Record*, 26: 27-28, 1914; Walker, J. J., *Ent. Mo. Mag.*, 49: 276-277, 1913; Musgrave, A., *Bib. Austr. Ent.*, p. 337, 1932; *A.*, *Cent. Hist. Ent. Soc. Lond.*, pp. 147-148, 1933; Nordenskiöld, Erik, *Hist. of Biol.*, p. 485, 1935.
- WALLENGREN, Hans Daniel Johan. (1823-1894). *A.*, *Ent. News*, 6: 132, 1895; McLachlan, R., *Ent. Mo. Mag.*, 31: 53-54, 1895; Aurivillius, C., *B. P.*, *Ent. Tidskr.*, 16: 97-110, 1895; *A.*, *Leopoldina*, 31: 54, 1895; Kraatz, G., *Deutsche Ent. Ztschr.*, 39: 279, 1895; Bergroth, E., *Wien. Ent. Zeit.*, 13: 295, 1894; Musgrave, A., *Bib. Austr. Ent.*, p. 337, 1932.
- WALSH, Benjamin Dann. (1808-1869). *A.*, *Can. Ent.*, 2: 42-43, 1870; *A.*, *P.*, *Ent. News*, 5: 269-270, 1894; Riley, C. V., *P.*, *Amer. Ent.*, 2 (3): 65-68, 1870; Smith, J. B., *P.*, *Pop. Sci. Mo.*, 76: 475-476, 1910; Tucker, E. A., *P.*, *Trans. Ill. State Hist. Soc.*, pp. 54-61, 1920; Goding, F. W., *Trans. Ill. St. Hort. Soc.*, 21: 152, 1887; Hagen, H., *Stett. Ent. Zeit.*, 31: 354-356, 1870; *A.*, *Ent. Mo. Mag.*, 6: 218-219, 1870; *A.*, *Nat. Can.*, 2: 94, 1870; Howard, L. O., *Dict. Amer. Biog.*, 19: 388-389, 1936; Howard, L. O., *Ann. Rpt. Smithsn. Inst.*, p. 389, 1930; Osten-Sacken, C. R., *Record of my life and work in entomology*, pp. 38-39, 1903; Howard, L. O., *P.*, *Hist. Applied Ent.*, 1930; Osborn, H., *P.*, *Fragments Ent. Hist.*, pp. 29-30, 1937.
- WALSINGHAM, Thomas de Grey. (Lord). (1843-1919). *A.*, *P.*, *Bailey's Mag.*, 56: 145, 1891; *A.*, *Ent. News*, 31: 148-149, 1920; Busck, A., *Proc. Ent. Soc. Wash.*, 22: 41-43, 1920; Durrant, J. H., *P.*, *Ent. Mo. Mag.*, 56: 17, 25-28, 1920; "Jehu, Jr.", *P.*, *Vanity Fair Album*, 14: 409, 1882; Rowland-Brown, H., *Entomologist*, 53: 23-24, 1920; *A.*, *Cent. Hist. Ent. Soc. Lond.*, pp. 149-150, 1933; Musgrave, A., *Austr. Ent.*, pp. 129-130, 1932; Essig, E. O., *P.*, *Pan-Pacific Ent.*, 97-113, 1941; Essig, E. O., *B.*, *P.*, *Hist. of Ent.*, pp. 791-792, 1931.
- WALTON, John. (1784-1862). Smith, F., *Trans. Ent. Soc. Lond.*, (3) 1 (Proc.): 125-127, 1862; *A.*, *Proc. Linn. Soc. Lond.*, pp. xlv-xlvi, 1863.
- WALTON, Lee Barker. (1871-1937). *A.*, *Arb. morph. taxon.* Ent. Berlin-Dahlem, 4: 241, 1937; Osborn, H., *Fragments Ent. Hist.*, p. 284, 1937.
- WANKA VON LENZENHEIM, Theodor. (1871-1932). Hetschko, A., *B.*, *P.*, *Wien. Ent. Zeit.*, 49: 186-188, 1932; Heikertinger, F., *Koleopt. Rundschau*, 18: 152, 1932.
- WANKOWITZ, Jean de. (1835-1885). Mik, J., et al., *Wien. Ent. Zeit.*, 4: 256, 1885.
- WARD, Christopher. (1837-1900). *A.*, *Ent. Mo. Mag.*, 36: 213, 1900.
- WARNIER, Adolphe. ( -1914). *A.*, *Miscellanea Ent.*, 22 (10): 50, 1915.
- WARREN, William. (1839-1914). *A.*, *Ent. Mo. Mag.*, 50: 294-295, 1914; *A.*, *Ent. News*, 26: 96, 1915; Prout, L. B., *Ent. Record*, 26: 258-260, 1914; Musgrave, A., *B.*, *Bib. Austr. Ent.*, pp. 338-339, 1932; Filipiev, J., *Rev. Russe Ent.*, 16: 147, 1916.
- WASASTJERNA, Björn Rudolf. (1860-1928). Forsuis, R., *P.*, *Notulae Ent.*, 8: 65-67, 1928.
- WASHBURN, Frederick Leonard. (1860-1927). *A.*, *Ent. News*, 39: 32, 1928; *A.*, *Journ. Econ. Ent.*, 20: 849-850, 1927; *A.*, *Science*, n. s., 66: 374, 1927; Osborn, H., *P.*, *Fragments Ent. Hist.*, p. 210, 1937.
- WASMANN, Erich. (1859-1931). *A.*, *Ent. News*, 42: 240, 1931; Meissner, O., *Ent. Ztschr. (Frankfurt)*, 43: 165, 1929; Donisthorpe, H., *Ent. Record*, 43: 76, 1931; Eltringham, H., *Proc. Ent. Soc. Lond.*, 6: 108, 1932; Heikertinger, F., *P.*, *Koleopt. Rundschau*, 17: 89-96, 1931; *A.*, *Wien. Ent. Zeit.*, 48: 64, 1931; Reichensperger, A., *P.*, *Zool. Anzeiger*, 82: 1-10, 1929; *A.*, *Bol. Soc. Ent. Espana*, 14: 42-46, 1931; Reichensperger, A., *Zool. Anzeiger*, 93, 336, 1931; Schulte, J. E.,

- P.*, Natuurh. Maandblad (Limburg), 18: 69-72, 1929; Reichensperger, A., *P.*, Mitt. Deutsche Ent. Ges., 2: 50-54, 1931; Schmitz, H., *B.*, *P.*, Tidschr. Ent., 75: 1-57, 1932; Borgmeier, T., Rev. Ent. (Rio de J.), 1: 107, 1931.
- WATERHOUSE, Charles Owen. (1843-1917). *A.*, Ent. News, 28: 337, 1917; Champion, G. C., *P.*, Ent. Mo. Mag., 53: 67-68, 1917; Gahan, C. J., Trans. Ent. Soc. Lond., (Proc.): cx-cxii, 1917; Distant, W. L., Entomologist, 50: 71-72, 1917; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 339-340, 1932.
- WATERHOUSE, Frederick Herschel. (1845-1919). *A.*, Ent. News, 31: 149, 1920; *A.*, Ent. Mo. Mag., 56: 17, 1920.
- WATERHOUSE, George Robert. (1810-1888). *A.*, Ent. Mo. Mag., 24: 233-234, 1888; Dimmock, G., Psyche, 5: 156, 1889; Waterhouse, C. O., Trans. Ent. Soc. Lond., (Proc.): lxx-lxxvi, 1888; Sharp, D., *l. c.*, p. xlix, 1888; Musgrave, A., *B.*, Bib. Austr. Ent., p. 341, 1932.
- WATERS, Edwin George Ross. (1890-1930). Turner, H. J., Ent. Record, 42: 80, 1930; Poulton, E. B., et al., Entomologist, 63: 167-168, 1930; Blair, K. G., et al., *P.*, Ent. Mo. Mag., 66: 91, 1930; Jordan, K., Proc. Ent. Soc. Lond., 5: 131, 1931; Musgrave, A., Bib. Austr. Ent., p. 343, 1932; Walker, J. J., *P.*, Ent. Mo. Mag., 66: 102-104, 1930.
- WATERSTON, James. (1879-1930). *A.*, Ent. News, 41: 280, 1930; Grimshaw, P. H., Scottish Nat., 183: 65-67, 1930; Laing, F., *P.*, Ent. Mo. Mag., 66: 141-142, 1930; Riley, N. D., Entomologist, 63: 143-144, 1930; Jordan, K., Proc. Ent. Soc. Lond., 5: 129-130, 1931.
- WATERTON, Charles. (1782-1865). *A.*, Ibis, n. s., 1: 364, 1865; *A.*, Naturalist, 2: 53, 1866; Carvalho, A. de, Rev. Mus. Paulista, 10: 895-903, 1918.
- WATKINS, Charles James. (1846-1906). *A.*, Ent. Record, 19: 194-195, 1907; *A.*, Entomologist, 40: 168, 1907; Horn, W., Deutsche Ent. Ztschr., p. 535, 1907.
- WATTENWYL, Carl Brunner von. (1823-1914). Burr, M., Ent. Record, 12: 5-6, 1900; Rehn, J. A. G., Ent. News, 26: 285-288, 1915.
- WEBB, Jesse Lee. (1878-1942). *A.*, Bur. Ent. & Plant Quar. News Letter, 9 (2): 2, 1942; Bishopp, F. C., *P.*, Proc. Ent. Soc. Wash., 44: 31-32, 1942; Bishopp, F. C., *P.*, Journ. Econ. Ent., 35: 117, 1942; Osborn, H., Fragments Ent. Hist., p. 284, 1937.
- WEBB, Sidney. (1837-1919). *A.*, Ent. News, 30: 210, 1919; Turner, H. J., Ent. Record, 31: 100, 1919; Rowland-Brown, H., Entomologist, 52: 119-120, 1919.
- WEBB, Thomas Hopkins. (1801-1866). Geiser, S. W., Naturalists of the frontier, p. 335, 1937.
- WEBER, Eduard. (1811-1871). *A.*, *B.*, Jahresh. Mannheimer Ver. Naturk., 38: 90-93, 1872.
- WEBSTER, Francis Marion. (1849-1916). *A.*, Ent. News, 27, 1916; Forbes, S. A., *P.*, Journ. Econ. Ent., 9: 239-241, 1916; Hewitt, C. G., Can. Ent., 48: 73-74, 1916; Howard, L. O., *P.*, Proc. Ent. Soc. Wash., 18: 78-83, 1916; Osborn, H., *P.*, Ann. Ent. Soc. Amer., 9: 104-105, 1916; Walton, W. R., Science, n. s., 43: 162-164, 1916; Wade, J. S., Proc. Ent. Soc. Wash., 38: 140-141, 1936; Howard, L. O., *P.*, Hist. of Applied Ent., 1930; Osborn, H., *P.*, Fragments Ent. Hist., 1937.
- WEDELL-WEDELLSBORG, August Frederik. (1844-1923). Henriksen, K. L., *P.*, Ent. Meddel., 14: 453-454, 1925.
- WEEKS, Andrew Gray, Jr. (1861-1931). Davis, J. J., Ann. Ent. Soc. Amer., 25: 251, 1932; *A.*, Ent. News, 43: 28, 1932; Osborn, H., Fragments Ent. Hist., pp. 228-229, 1937.
- WEELE, Herman Willem van der. (1879-1911). *A.*, Ent. News, 22: 287-288, 1911; Everts, E., *B.*, *P.*, Tidschr. Ent., 54: 1-5, 1911; "J. J. T.", Tidschr. Ned. Dierk. Ver., (2) 12: 3-4, 1910-13; Musgrave, A., *B.*, Bib. Austr. Ent., p. 344, 1932.
- WEHNCKE, Ernst. (1835-1883). Kolbe, H. J., Berlin. Ent. Ztschr., 28: 213-214, 1884; *A.*, Psyche, 4: 236, 1884; Regimbart, M. A., Ann. Soc. Ent. France, (6) 3 (Bull.): cxxx, 1883; Musgrave, A., *B.*, Bib. Austr. Ent., p. 344, 1932.
- WEIDENBACH, Ludwig von. ( -1830). Gisl, J., Faunus, 1 (1): 52, 1832.
- WEIGEL, Johann Adam Valentin. (1740-1806). Letzner, K., Ztschr. Ent. Breslau, 12: 13-15, 1858.
- WEIR, John Jenner. (1822-1894). McLachlan, R., Ent. Mo. Mag., 30: 116-117, 1894;



- Tutt, J. W., *P.*, Ent. Record, 5: 103-105, 1894; *A.*, *P.*, Entomologist, 27: 157-159, 1894.
- WEIS, Albrecht. (1839-1914). Heyden, L. von, Ent. Blätter, 10: 128, 1914; Schnaudigel, O., *P.*, Ber. Senckenberg. Naturf. Ges., 45: 99-109, 1914.
- WEIS, Holger. (1854-1933). Wolff, N. L., *P.*, Ent. Meddel., (Copenhagen), 18: 494-496, 1934.
- WEISE, Julius. (1844-1925). *A.*, Deutsche Ent. Ztschr., p. 88, 1925; Forschefsky, R., *B.*, Ent. Blätter, 24: 175-186, 1928; *A.*, Wien. Ent. Zeit., 42: 54, 1925; Musgrave, B., Bib. Austr. Ent., pp. 344-345, 1932; Hedicke, H., Deutsche Ent. Ztschr., p. 88, 1925.
- WEISER, Vladimir. (1878-1926). Rambousek, F. J., Acta Soc. Ent. Cechosl., 23: 78, 1926.
- WEISMANN, Friedrich Leopold August. (1834-1914). Calvert, P. P., Ent. News, 26: 44-47, 1915; *A.*, Wien. Ent. Zeit., 34: 68, 1915; *A.*, Ent. Blätter, 11: 191, 1915; Schleip, W., *P.*, Schmid & Thesing's Biologen-Kalender, 1: vi-ix, 1914.
- WEITH, R. J. (1847-1902). *A.*, Can. Ent., 34: 278, 1902; Needham, J. G., Can. Ent., 35: 36-37, 1903; *A.*, Ent. News, 13: 298, 1902.
- WELLES, Charles S. (1847-1914). Calvert, P. P., Ent. News, 25: 192, 1914.
- WELLS, M. M. ( -1930). Davis, J. J., Ann. Ent. Soc. Amer., 24: 188, 1931.
- WENCKER, Joseph Antoine. (1824-1873). Brisout de Barneville, C., Ann. Soc. Ent. France, (5) 3 (Bull.): xl, 1873; Newman, E., Entomologist, 6: 368, 1872-73; *A.*, Pet. Nouv. Ent., 4: 287, 1873; Fauvel, A., Annuaire Ent., 2: 121, 1874.
- WENZEL, Henry W. (1857-1925). *A.*, Ent. News, 36: 320, 1925; Haimbach, F., *P.*, Ent. News, 37: 29-31, 1926; Osborn, H., *P.*, Fragments Ent. Hist., p. 217, 1937.
- WERMELIN, Johan Henrik. (1850-1910). Meves, J., *P.*, Ent. Tidskr., 37: 107-108, 1911.
- WERNEBURG, Adolf. ( -1886). McLachlan, R., Trans. Ent. Soc. Lond., (Proc.): lxx, 1886; *A.*, Wien. Ent. Zeit., 5: 111, 1886; Kraatz, G., Deutsche Ent. Ztschr., 30: 254, 1886.
- WERNER, Franz. (1867-1939). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 6: 187, 1939; Strouhal, H., *P.*, Folio Zool. & Hydrobiol. (Riga), 9: 311-313, 1939; *A.*, Zool. Anzeiger, 125: 336, 1939; Pinter, T., Forschungen und Fortschritte, 15: 140, 1939.
- WERNER, Jon. (1884-1937). *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 5: 186, 1938; "L. R. N.", *B.*, *P.*, Norsk Ent. Tidskrift, 5: 40-41, 1938.
- WESMAEL, Constantin. (1798-1872). *A.*, Ent. Mo. Mag., 9: 167, 1872; Selys Longchamps, E. de, *B.*, *P.*, Ann. Acad. Belg., 40: 229-250, 1874; Sauveur, J., Ann. Soc. Ent. Belg., 15: 213-233, 1872; *A.*, Bull. Acad. Belg., (2) 34: 398-399, 1872; *A.*, Journ. Zool., 1: 535, 1872; *A.*, Pet. Nouv. Ent., 4: 258, 1872; Westwood, J. O., Trans. Ent. Soc. Lond. (Proc.): li, 1872; Kraatz, G., Berlin. Ent. Ztschr., 17: 5-6, 1873; Albarda, W., Tidschr. Ent., 17: ii-iii, 1873.
- WEST, James Alexander. (1877-1910). Forbes, S. A., Journ. Econ. Ent., 3: 384-385, 1910.
- WEST, Richard Milbourne. (1867-1936). "W. R.-S.", Ent. Mo. Mag., 72: 280, 1936; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 160, 1937; Imms, A. D., Proc. Roy. Ent. Soc. Lond., (C) 1: 55, 1937.
- WEST, William. (1836-1920). *A.*, Ent. News, 32: 64, 1921; Ashby, S. R., Ent. Mo. Mag., 56: 213, 1920; Turner, H. J., Ent. Record, 32: 175-176, 1920; Adkin, R., Entomologist, 53: 215-216, 1920.
- WESTCOTT, Oliver Spink. (1834-1919). *A.*, *B.*, Ent. News, 31: 119-120, 1920; Osborn, H., *P.*, Fragments Ent. Hist., p. 180, 1937.
- WESTERMANN, Bernt Wilhelm. (1781-1868). Dohrn, C. A., Stett. Ent. Zeit., 29: 215-218, 1868; Henriksen, K. L., *P.*, Ent. Meddel., 15: 161-164, 1925.
- WESTHOFF, Friedrich. (1857-1896). *A.*, Ent. News, 8: 72, 1897; Reeker, H., *B.*, *P.*, Jahresber. Westfäl. Prov.-Ver., 25: 31-37, 1896-98; *A.*, Leopoldina, 32: 189, 1896.
- WESTON, Walter Philip. (1853-1881). Carrington, J. T., Entomologist, 14: 72, 96, 1881.

- WESTRING, Niklas. (1797-1882). Sandahl, O. T., Ent. Tidskr., 3: 9-12, 99, 1882; *A.*, Zool. Anzeiger, 5: 556, 1882; *A.*, Leopoldina, 18: 209, 1882.
- WESTWOOD, John Obadiah. (1805-1893). *A.*, *P.*, Can. Ent., 25: 261-262, 1893; *A.*, *P.*, London News, 102: 38, 1893; Bethune, C. J. S., *P.*, Ann. Rpt. Ent. Soc. Ont., 24: 107-108, 1893; McLachlan, R., *P.*, Ent. Mo. Mag., 29: 49-51, 1893; Strecker, H., *B.*, Butterflies and moths of N. A., pp. 278-279, 1878; Swainson, W., *B.*, Bib. of Zool., p. 368, 1840; Dohrn, H., Stett. Ent. Zeit., 53: 330-331, 1892 (1893); Distant, W. L., Entomologist, 26: 25-26, 1893; Cambridge, O. P., Entomologist, 26: 74-75, 1893; *A.*, Ent. Nachr., 19: 77-79, 1893; Sandahl, O. T., Ent. Tidskr., 14: 79-80, 1893; *A.*, *P.*, Cent. Hist. Ent. Soc. Lond., pp. 131-132, 1933; Wandolleck, B., *P.*, Berlin. Ent. Ztschr., 38: 392-396, 1893; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 345-350, 1932; Kraatz, G., Deutsche Ent. Ztschr., 37: 11, 1893 (*P.* only in 38, 1894; *A.*, Insect Life, 5: 285-286, 1893; Howard, L. O., *P.*, Hist. of Applied Ent., 1930).
- WEYENBERGH, Hendrik. (1842-1885). Wulp, F. M. van der, Wien. Ent. Zeit., 4: 225-227, 1885; Hasselt, A. W. M., Tidschr. Ent., 30: iv-v, 1886-87.
- WHEELER, William Morton. (1865-1937). Constant, J. B., Ent. News, 48: 143, 1937; Carpenter, F. M., Journ. Econ. Ent., 30: 568-569, 1937; *A.*, Bull. Soc. Ent. France, 42: 129, 1937; Bruce, C. T., *B.*, *P.*, Psyche, 44: 61-96, 1937; Donisthorpe, H., Entomologist, 70: 191-192, 1937; Melander, A. L., et al., *P.*, Ann. Ent. Soc. Amer., 30: 433-437, 1937; Barber, H. G., et al., *P.*, Proc. Ent. Soc. Wash., 39: 191-192, 1937; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 4: 241, 1937; Bruch, C., *P.*, Rev. Soc. Ent. Argent., 9: 27-29, 1937; Imms, A. D., Proc. Roy. Ent. Soc., (C) 2: 60, 1937; Mickel, C. E., Ann. Ent. Soc. Amer., 31: 121, 1938; Imms, A. D., Proc. Linn. Soc. Lond., pp. 219-221, 1936-37; Zimmerman, E. C., Proc. Haw. Ent. Soc., 10: 7, 1938; Frennet, L., Bull. & Ann. Soc. Ent. Belg., 77: 257, 1937; Eidman, H., *P.*, Ztschr. Angew. Ent., 22: 514-515, 1935; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 350-351, 1932; Weiss, H. B., Journ. N. Y. Ent. Soc., 51: 287-288, 1943; Essig, E. O., *B.*, *P.*, Hist. of Ent., pp. 793-796, 1931; Osborn, H., *P.*, Fragments Ent. Hist., pp. 236-237, 1937.
- WHEELWRIGHT, Horace William. (1815-1865). Froggatt, W. W., Austr. Nat., 11: 186-187, 1924; Musgrave, A., Bib. Austr. Ent., p. 351, 1932.
- WHITE, Adam. (1817-1879). McLachlan, R., Ent. Mo. Mag., 15: 210-211, 1879; *A.*, Psyche Advertiser, Mar., p. 7, 1879; *A.*, Zool. Anzeiger, 2: 96, 1879; *A.*, Pet. Nouv. Ent., 2 (214): 303, 1879; Dunning, J. W., Trans. Ent. Soc. Lond. (Proc.): lxiv, 1879; Musgrave, A., *B.*, Bib. Austr. Ent., pp. 351-352, 1932; *A.*, Deutsche Ent. Ztschr., 23: 8, 1879.
- WHITE, Arthur. (1871-1918). *A.*, *B.*, Pap. & Proc. Roy. Soc. Tasmania, p. 128, 1917 (1918); Musgrave, A., *B.*, Bib. Austr. Ent., p. 353, 1932.
- WHITE, Francis Buchanan. (1842-1894). Elwes, H. J., Trans. Ent. Soc. Lond. (Proc.): li, 1894; *A.*, Ent. Record, 6: 56, 1895; *A.*, *B.*, *P.*, Entomologist, 28: 25-27, 1895; *A.*, Ent. Mo. Mag., 31: 30-31, 1895.
- WHITE, Gershon Franklin. (1873-1937). Bishopp, F. C., *P.*, Proc. Ent. Soc. Wash., 39: 184-188, 1937; *A.*, Arb. phys. angew. Ent. Berlin-Dahlem, 5: 78, 1938; *A.*, U. S. Dept. Agr. Ent. & Plant Quar. News Letter, 4 (5): 1, 1937.
- WHITE, Gilbert. (1720-1793). "D. L.", Album der Natuur, pp. 220-234, 1856; Newton, A., *B.*, Notes & Queries, (5) 7: 241-243, 264-265, 1877.
- WHITE, Henry G. (1850-1899). Newcomb, H. H., Ent. News, 10: 110, 1899.
- WHITE, William Farren. (1834-1899). *A.*, Leopoldina, 35: 184, 1899.
- WHITEHOUSE, Beckwith. (1833-1943). "H. B. D. K.", Entomologist, 76: 240, 1943.
- WHITELEGGE, Thomas. (1850-1927). McNeill, F. A., *B.*, *P.*, Rec. Austr. Mus., 17: 265-277, 1929.
- WHITTINGHAM, Walter Godfrey. (1861-1941). Metcalfe, J. W., Entomologist, 74: 191-192, 1941; Blair, K. C., Proc. Roy. Ent. Soc. Lond., (C) 6: 41, 1941-42.
- WHITTLE, Francis George. (1854-1921). Sheldon, W. G., Entomologist, 54: 302-303, 1921.
- WICKHAM, Archdale Palmer. (1855-1935). Hayward, A. R., Entomologist, 68: 291-292, 1935; *A.*, Arb. morph. taxon. Ent. Berlin-Dahlem, 3: 64, 1936.
- WICKHAM, Henry Frederick. (1866-1933). Buchanan, L. L., *P.*, Proc. Ent. Soc.

- Wash., 36: 60-64, 1934; Calvert, P. P., *Ent. News*, 45: 83-84, 1934; Hungerford, H. B., *Ann. Ent. Soc. Amer.*, 27: 123-124, 1934; Osborn, H., *P., Fragments Ent. Hist.*, pp. 195-197, 1937.
- WIDHALM, I. M. (See under VIDGHAL'M).
- WIEDEMANN, Christian Rudolph Wilhelm. (1770-1840). Swainson, W., *Bib. of Zool.*, p. 369, 1840.
- WIEPKIN, Carl Friedrich. (1815-1897). *A., Ent. News*, 8: 120, 1897; *A., Leopoldina*, 33: 52, 1897; *A., Ornith. Monatsber.* 5: 50, 1897; Mik, J., et al., *Wien. Ent. Zeit.*, 16: 80, 1897; Kraatz, G., *Deutsche Ent. Ztschr.*, 41: 208, 1897.
- WIGHT, Robert Allan. (1823-1896). Howard, L. O., *Ent. News*, 8: 156-159, 1897.
- WILDER, Gerrit Parmele. (1863-1935). Swezey, O. H., et al., *Proc. Hawaiian Ent. Soc.*, 9: 189-190, 1936.
- WILEMAN, A. E. (1860-1929). Riley, N. D., *Entomologist*, 62: 215-216, 1929; Jordan, K., *Proc. Ent. Soc. Lond.*, 4: 130-131, 1930.
- WILKIN, Simon. (1790-1862). *A., Proc. Linn. Soc. Lond.*, pp. xli-xlix, 1863.
- WILKINSON, Samuel James. (1805-1903). McLachlan, R., *Ent. Mo. Mag.*, 39: 256, 1903.
- WILLARD, Harold Francis. (1884-1939). Mason, A. C., et al., *P., Journ. Econ. Ent.*, 32: 893, 1939; Mickel, C. E., *Ann. Ent. Soc. Amer.*, 33: 218, 1940; Pemberton, C. E., et al., *B., Proc. Hawaiian Ent. Soc.*, 10: 447-449, 1940; Osborn, H., *Fragments Ent. Hist.*, pp. 285-286, 1937.
- WILLIAMS, Benjamin Samuel. (1891-1941). Harwood, P., *Ent. Mo. Mag.*, 77: 93, 1941.
- WILLIAMS, John Bickerton. (1848-1916). *A., Can. Ent.*, 48: 248, 1916.
- WILLIAMSON, Edward Bruce. (1877-1933). Calvert, P. P., *P., Ent. News*, 46: 1-13, 1935; Davis, J. J., *Proc. Indiana Acad. Sci.*, 43: 23-25, 1934; Hungerford, H. B., *Ann. Ent. Soc. Amer.*, 27: 124, 1934; Davis, J. J., *P., Proc. Indiana Acad. Sci.*, 41: 51, 1932; Osborn, H., *P., Fragments Ent. Hist.*, p. 219, 1937.
- WILLISTON, Samuel Wendell. (1852-1918). Aldrich, J. M., *P., Ent. News*, 29: 322-327, 1918; *A., Can. Ent.*, 51: 39-41, 1919; Brown, B., *P., Nat. Hist.*, 18: 611, 1918; Lull, R. S., *Amer. Journ. Sci.*, (4) 7: 220-224, 1919; Lull, R. S., *B., P., Mem. Acad. Nat. Sci.*, 17: 115-141, 1924; Osborn, H., et al., *P., Ann. Ent. Soc. Amer.*, 12: 56, 1919; Hungerford, H. B., *P., Journ. Kansas Ent. Soc.*, 9: 32, 1936; Osborn, H. F., et al., *P., Sigma Xi Quart.*, 7 (1): 1-40, 1919; Osborn, H. F., *Science*, n. s., 49: 274-278, 1919; Musgrave, A., *Bib. Austr. Ent.*, p. 354, 1932; Essig, E. O., *B., P., Hist. of Ent.*, pp. 796-800, 1931; Osborn, H., *P., Fragments Ent. Hist.*, p. 189, 1937.
- WILLUGHBY-ELLIS, Herbert. (1869-1943). Blair, K. G., *Ent. Mo. Mag.*, 79: 280, 1943.
- WILLUGHBY, Francis. (1635-1672). Miall, L. C., *Early naturalists, their lives and work*, pp. 99-130, 1912; Locy, W. A., *P., Story of Biol.*, pp. 305-308, 1925.
- WILSE, Jacon Nicolai. (1736-1801). Strand, E., *Archiv Naturg.*, Abt. A, 83 (7): 154-156, 1917 (1919).
- WILSON, Charles Branch. (1861-1941). Calvert, P. P., *Ent. News*, 52: 269-270, 1941; *A., Science*, 94: 204, 1941.
- WILSON, George Ringo. (1885-1938). Armitage, H. M., *Journ. Econ. Ent.*, 31: 549-550, 1938; Armitage, H. M., *Pan-Pacific Ent.*, 14: 143-144, 1938.
- WILSON, Owen S. ( -1890). *A., Ent. News*, 2: 40, 1891; *A., Ent. Mo. Mag.*, 26: 305, 1890.
- WILSON, Tom. (1856-1917). Hewitt, C. C., *Can. Ent.*, 49: 289-290, 1917; Treherne, R. C., *P., Proc. Ent. Soc. Brit. Col.*, 10 (Syst. Ser.): 30-31, 1917.
- WILT, Charles. (1821-1886). Horn, G. H., *Trans. Amer. Ent. Soc.*, 13: vi, xxi, 1886.
- WIMMERS, Carl Ernst. (1873-1932). Pfaff, G., *Ent. Ztschr.*, Frankfurt, 46: 85, 1932.
- WINN, Albert F. ( -1935). Moore, A. G., *Can. Ent.*, 67: 255, 1936; *A., Ann. Rpt. Ent. Soc. Ont.*, 66: 5, 1935.
- WINN-SAMPSON, F. (See under SAMPSON).
- WINNERTZ, Johannes. (1800-1896). Osten-Sacken, C. R., *Record of my life and work in entomology*, pp. 44-47, 1903.
- WINTERHALTER, Wilhelm. (1905-1932). Schneider-Orelli, O., *Mitt. Schweiz. Ent.*

- Ges., 15: 212-213, 1932.
- WISKOTT, Max. (1840-1911). "H.", Deutsche Ent. Ztschr. "Iris", 25: 126, 1911. Dittrich, R., B., Jahresh. Ver. Schles. Insektenk., 1: xxvi-xxix, 1911; Semenov-Tian-Shanskij, A., Rev. Russe Ent., 12: 638-639, 1912.
- WITHYCOMBE, Cyril Luckes. (1898-1926). *A.*, Ent. Record, 37: 178, 1926; *A.*, Ent. News, 38: 96, 1927; *A.*, Science, 64: 646, 1926; Poulton, E. B., Proc. Ent. Soc. Lond., 1: 77-78, 1926; *A.*, Ent. Mo. Mag., 63: 16-17, 1927.
- WITLACZIL, Emanuel. ( -1926). *A.*, Wien. Ent. Zeit., 43: 194, 1926.
- WITTRICK, Veit Brecher. (1839-1914). Palmen, J. A., Medd. Soc. Fauna et Flora Fenn., 41: 104, 1915.
- WOCKE, Georg. (1849-1907). Schaufuss, C., Ent. Wochenbl., 24: 187, 1907.
- WOCKE, Maximilian Ferdinand. (1820-1906). "D.", *P.*, Ent. Wochenbl., 24: 29, 1907; Horn, W., Deutsche Ent. Ztschr., pp. 95, 229-230, 1907; *A.*, Leopoldina, 43: 56, 1907; *A.*, Ann. Soc. Ent. Belg., 50: 373, 1906; Dittrich, R., B., *P.*, Ztschr. Ent. (Breslau), 32: xxxvi-xlvi, 1907; Türk, G., Jahresh. Schles. Ges. Vaterl. Cultur (Breslau), 84: 55-56, 1906 (1907).
- WOLCOTT, Robert Henry. (1868-1934). *A.*, Ent. News, 45: 112, 1934; Hungerford, H. B., Ann. Ent. Soc. Amer., 28: 180, 1935; Osborn, H., Fragments Ent. Hist., p. 229, 1937.
- WOLLASTON, Thomas Vernon. (1822-1878). *A.*, Ann. Rpt. Ent. Soc. Ont., 9: 25, 1878; *A.*, Amer. Naturalist, 12: 197, 1878; *A.*, Can. Ent., 10: 34-35, 1878; *A.*, Ent. Mo. Mag., 14: 213-215, 1878; Westwood, J. O., Trans. Ent. Soc. Lond., (Proc.), p. xxxviii, 1877 (1878); *A.*, Pet. Nouv. Ent., 2: 206, 1878; *A.*, Cent. Hist. Ent. Soc. Lond., p. 133, 1933; Kraatz, G., Deutsche Ent. Ztschr., 22: 228-229, 1878; "E. C. R.", Nature, 17: 210, 1878; *A.*, Ann. & Mag. Nat. Hist., (5) 1: 178-181, 1878; Musgrave, A., Bib. Austr. Ent., p. 356, 1932.
- WOLLEY-DOD, Frederic Hova. ( -1919). *A.*, Ent. News, 31: 30, 1920; *A.*, Ann. Rpt. Ent. Soc. Ont., 50: 8-9, 1919; "F. C. W.", Can. Ent., 51: 240, 1919.
- WOOD, Herbert Poland. (1883-1925). Bishopp, F. C., Journ. Econ. Ent., 19: 574, 1926.
- WOOD, Horatio Charles. (1841-1919). Gunthrop, H., B., Can. Ent., 52: 112-114, 1920; Skinner, H., et al., B., Ent. News, 31: 115-118, 1920; *A.*, Science, 51: 106-107, 1920; Osborn, H., Fragments Ent. Hist., p. 227, 1937.
- WOOD, John George. (1827-1889). *A.*, Ent. Mo. Mag., 25: 262, 1889.
- WOOD, John Henry. (1841-1914). *A.*, B., Ent. Record, 26: 256-258, 1914.
- WOOD, Leonard. (1874-1941). Watkins, N. A., Entomologist, 75: 24, 1942.
- WOOD, Samuel T. (1860-1917). *A.*, Can. Ent., 50: 34-35, 1918.
- WOOD, Theodore. (1862-1923). *A.*, Ent. Mo. Mag., 60: 20, 1924; *A.*, Ent. News, 35: 152, 1924; *A.*, Nature, 115: 21, 1924.
- WOODFORD, Francis Cardew. (1846-1928). Walker, J. J., Ent. Mo. Mag., 64: 237-238, 1928.
- WOOD-MASON, James. (1846-1893). *A.*, Ent. Mo. Mag., 29: 145-146, 1893; *A.*, Ent. News, 4: 280, 1893; Elwes, H. J., Trans. Ent. Soc. Lond., (Proc.), p. lvi, 1893; Musgrave, A., B., Bib. Austr. Ent., pp. 356-357, 1932.
- WOODRUFF, Lewis Bartholomew. (1868-1925). *A.*, Ent. News, 37: 160, 1926; *A.*, Nat. Hist., 26: 338, 1926; Davis, W. T., B., *P.*, Journ. N. Y. Ent. Soc., 34: 23-25, 1926; Osborn, H., Fragments Ent. Hist., p. 211, 1937.
- WOODWARD, Samuel Pickworth. (1821-1865). *A.*, Amer. Journ. Conch., 1: 379, 1865; *A.*, Proc. Linn. Soc. Lond., pp. lxxxvi-lxxxvii, 1865-66; *A.*, Amer. Journ. Sci., (2) 40: 288, 1865; *A.*, Naturalist (London), 2: 155-156, 1866.
- WOODWORTH, Charles William. (1865-1940). *A.*, Ent. News, 52: 30, 1941; Essig, E. O., *P.*, Journ. Econ. Ent., 34: 128-129, 1941; Essig, E. O., Pan-Pacific Ent., 17: 30, 1941; Essig, E. O., Ann. Ent. Soc. Amer., 34: 264-265, 1941; *A.*, Rev. Ent. (Rio de J.), 12: 416, 1941; Howard, L. O., Hist. Applied Ent., pp. 110, 158, 398, 1930; Essig, E. O., B., *P.*, Hist. of Ent., pp. 800-802, 1931; Osborn, H., Fragments Ent. Hist., p. 286, 1937.
- WORM, Ole. (1588-1654). Henriksen, K. L., *P.*, Ent. Meddel., 15: 17-19, 1921.
- WORMSBACHER, Henry. ( -1934). *A.*, Ent. News, 45: 202, 1934.
- WORTHLEY, Leon Howard. (1877-1937). *A.*, Can. Ent., 69: 276, 1937; Walton, W.

- R., et al., *P.*, Journ. Econ. Ent., 31: 132-135, 1938; *A.*, Arb. phys. angew. Ent. Berlin-Dahlem, 5: 78, 1938; Osborn, H., *P.*, Fragments Ent. Hist., p. 286, 1937.
- WOTTON, Edward. (1492-1555). Locy, W. A., Story of Biol., pp. 284-285, 1925.
- WRANGELL, Ferdinand Petrovich. (1794-1870). Essig, E. O., Hist. of Ent., p. 802, 1931.
- WRIGHT, Albert Allen. (1846-1905). *A.*, Ent. News, 16: 160, 1905; Wilder, F. A., *B.*, Bull. Geol. Soc. Amer., 17: 687-690, 1906.
- WRIGHT, Chauncey. (1830-1875). *A.*, Proc. Amer. Acad. Arts & Sci., 11: 350, 1876.
- WRIGHT, John Cassimir. (1842-1924). Engelhardt, G. P., Bull. Bklyn. Ent. Soc., 21: 128, 1926.
- WRIGHT, William Greenwood. (1830?-1912). *A.*, Can. Ent., 45: 116, 1913; Grinnell, F., Jr., Ent. News, 24: 91-92, 1913; Coolidge, K. R., Ent. News, 22: 11-13, 1911; Essig, E. O., *P.*, Hist. of Ent., pp. 802-804, 1931.
- WRIGHT, William Sherman. (1866-1933). Essig, E. O., *B.*, Ent. News, 45: 27-28, 1934; Osborn, H., Fragments Ent. Hist., p. 229, 1937.
- WROUGHTON, Robert Charles. (1849-1921). *A.*, Ent. Mo. Mag., 57: 161, 1921.
- WULFEN, Franz Xaver von. (1728-1805). Nardo, G. D., Comment. Fauna e Flora Veneto e Trent, 1: 201-210, 1868.
- WULF, Kurt. (1881-1939). West, A., *P.*, Ent. Meddel., 20: 587-589, 1940.
- WULLSCHLEGEL, Arnold. (1849-1912). Vorbrodt, K., Mitt. Schweiz. Ent. Ges., 12: 172-173, 1913; Stierlin, R., Mitt. Schweiz. Ent. Ges., 12: 312-313, 1914; Wheeler, G., Ent. Record, 24: 317, 1912.
- WULLSCHLEGEL, Jakob. (1818-1905). Thut, W., *B.*, Mitt. Aargau. Naturf. Ges., 11: 114-117, 1909.
- WULP, Frederik Maurits van der. (1818-1899). *A.*, Deutsche Ent. Ztschr., 43: 7, 1899; Verrall, G. H., Ent. Mo. Mag., 36: 16-17, 1900; *A.*, Leopoldina, 36: 55, 1900; *A.*, Ent. Nachr., 26: 46-47, 1900; Mik, J., Wien. Ent. Zeit., 18: 300, 1899; Verrall, G. H., Trans. Ent. Soc. Lond., (Proc.): xxxvii-xxxviii, 1899; Musgrave, A., Bib. Austr. Ent., p. 357, 1932.
- WYMAN, Jeffries. (1814-1874). Gray, A., Amer. Journ. Sci., (3) 8: 323-324, 1874; Gray, A., Amer. Journ. Sci., (3) 9: 81-93, 171-177, 1875; *A.*, Nature, 10: 487, 1874; Bouvé, T. T., Proc. Bost. Soc. Nat. Hist., 17: 95-126, 1875; *A.*, Proc. Linn. Soc. Lond., pp. lxx-lxxv, 1874-75; *A.*, Bull. Essex Inst., 7: 93, 1876; Wilder, B., *G.P.*, Pop. Sci. Mo., 6: 355-360, 1875.
- WYTSMAN, Philogène Auguste Galilée. (1866-1925). *A.*, Ent. News, 36: 224, 1925; *A.*, Ent. Mo. Mag., 61: 136, 1925; *A.*, Bull. Soc. Ent. France, p. 97, 1925; *A.*, Bull. & Ann. Soc. Ent. Belg., 65: 91, 1925; Hedicke, H., Deutsche Ent. Ztschr., p. 250, 1925.
- XAMBEU, Pierre. (1837-1917). *A.*, Ent. News, 29: 80, 1918; Desbordes, H., Bull. Soc. Ent. France, p. 189, 1917.
- XANTUS DE VESEY, Louis John. (1825-1894). Essig, E. O., Hist. of Ent., pp. 804-808, 1931.
- YAKOBSON, G. G. (See under JACOBSON).
- YAKOVLEV, Alexander Ivanovich. (1863-1909). *A.*, *B.*, *P.*, Rev. Russe Ent., 10: lxi-lxxiv, 1910.
- YAROSHEVSKII, Vasilii Alekseyevich. (1841-1901). Schewyrev, J., *B.*, Rev. Russe Ent., 1: 70-71, 1901.
- YARRELL, William. (1784-1856). Newman, E., Zoologist, 14: 5257-5258, 1856; Saunders, W. W., Zoologist, 14: 5304, 1856.
- YATES, James. (1789-1871). "W. C.", Geol. Mag., 8: 480, 1871.
- YERBURY, John William. (1847-1927). *A.*, Ent. News, 39, 296, 1928; Collin, J. E., Ent. Mo. Mag., 64: 91-92, 1928; Collin, J. E., Proc. Ent. Soc. Lond., 2: 102-103, 1927.
- YERSIN, Alexander. (1829-1863). Forel, A., *B.*, Bull. Soc. Vaudoise, 8: 228-234, 1864; Saussure, H. de, *B.*, *P.*, Mitt. Schweiz. Ent. Ges., 2: 75-106, 1866.
- YOUNG, Douglas Barzillae. (1860-1925). Felt, E. P., Journ. Econ. Ent., 19: 419, 1926.

- ZABRISKIE, Jeremiah Lott. (1835-1910). *A.*, *Can. Ent.*, 42: 168, 1910; *A.*, *P.*, *Journ. N. Y. Ent. Soc.*, 18: 127, 1910.
- ZACHARIAS, Otto. (1846-1916). Soldanski, H., *Deutsche Ent. Ztschr.*, p. 605, 1916.
- ZADDACH, Ernst Gustav. (1817-1881). Kraatz, G., *Deutsche Ent. Ztschr.*, 25: 342, 1881; Katter, F., *Ent. Nachr.*, 7: 232, 1881; *A.*, *Zool. Anzeiger*, 4: 364, 1881; Albrecht, P., *Schrift. Phys.-Ökon. Ges. Königsberg*, 22: 119-128, 1881.
- ZAPATER, Peter Bernardo. (1816?-1907). *A.*, *Ent. Record*, 20: 69, 1908; Horn, W., *Deutsche Ent. Ztschr.*, p. 294, 1908; Navas, L., *P.*, *Bol. Soc. Espan. Hist. Nat.*, 8: 131-135, 1908.
- ZELLER, Philipp Christoph. (1808-1883). "A. R. G.", *Ann. Rpt. Ent. Soc. Ont.*, 14: 82, 1883; "A. R. G.", *Can. Ent.*, 15: 176-177, 1883; Dunning, J. W., *Trans. Ent. Soc. Lond.*, (Proc.): xlv-xlvi, 1883; Stainton, H. T., *P.*, *Ent. Mo. Mag.*, 20: 1-8, 1883; Strecker, H., *B.*, *Butterflies and moths of N. A.*, pp. 279-283, 1878; Dohrn, C. A., et al., *B.*, *P.*, *Stett. Ent. Zeit.*, 44: 406-418, 1883; Frey, H., *Mitt. Schweiz. Ent. Ges.*, 6: 693, 1884; Osten-Sacken, C. R., *Record of my life and work in entomology*, pp. 137-142, 1903; Mik, J., *Wien. Ent. Zeit.*, 2: 160, 1883; Türckheim, H. von, *Berlin. Ent. Ztschr.*, 27: ii, 1883; Kraatz, G., *Deutsche Ent. Ztschr.*, 27: 397, 1883; *A.*, *Ent. Nachr.*, 10: 43-44, 1884; Musgrave, A., *Bib. Austr. Ent.*, p. 358, 1932; Grote, A. R., *Papilio*, 3: 120-121, 1883; Essig, E. O., *B.*, *P.*, *Hist. of Ent.*, pp. 808-810, 1931.
- ZEMENA, Josefa. (1859-1925). Rombousek, F. J., *P.*, *Acta Soc. Ent. Cechosl.*, 22: 4-5, 1925.
- ZETTERSTEDT, Johann Wilhelm. (1785-1874). Dohrn, C. A., *Stett. Ent. Zeit.*, 36: 192-193, 1875; *A.*, *Ent. Mo. Mag.*, 11: 211, 1875; Lichtenstein, J., *Ann. Soc. Ent. France*, (5) 5: 9-10, 1875; *A.*, *Pet. Nouv. Ent.*, 7: 472, 1875; *A.*, *Journ. Zool.*, 4: 60, 1875.
- ZIEGLER, Daniel. (1804-1876). Hagen, H. A., *Ann. Rpt. Ent. Soc. Ont.*, 16: 22, 1886; Morris, J. G., *Can. Ent.*, 17: 132-133, 1885; Osborn, H., *Fragments Ent. Hist.*, p. 27, 1937.
- ZIMMERMAN, Charles Christoph Andrew. (1800-1867). Dow, R. P., *Bull. Bklyn. Ent. Soc.*, 8: 110-114, 1913; Hagen, H. A., *Ann. Rpt. Ent. Soc. Ont.*, 20: 101-103, 1889; Hagen, H. A., *Can. Ent.*, 21: 53-57, 71, 73, 1889.
- ZOUFAL, Vladimir. (1856-1932). Rombousek, F., *P.*, *Acta Soc. Ent. Cechosl.*, 28: 45-46, 1931; Heikertinger, F., *Koleopt. Rundschau*, 19: 150, 1933; Maran, J., *P.*, *Acta Soc. Ent. Cechosl.*, 30: 5-8, 1933.

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## The Cactus Moth, *Melitara dentata* (Grote), and its Effect on *Opuntia macrorrhiza* in Western Kansas<sup>1</sup>

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### Introduction

Prickly pear cactus, *Opuntia macrorrhiza* Engelm., is a definite and well-known constituent of the vegetation in the Great Plains of the United States. It plays a prominent part in the bio-ecology of the short grass range lands of this region. (Fig. 1).

During periods of drought the cactus increases in abundance and vigor, but is reduced to a minimum during periods of abundant rainfall. Its increase during years of below normal rainfall may be attributed to its high resistance to drought, lack of competition from grasses and other vegetation, and environmental conditions which are unfavorable to the development of insects which feed on the cactus and destroy it.

Those insects which attack cactus have received considerable attention from the Bureau of Entomology and the Forest Service of the United States Department of Agriculture. During the past few years, range supervisors of the Agricultural Adjustment Administration have made field observations, indicating that insect damage has reduced cactus stands on ranges in Western Kansas and Eastern Colorado. Observations made by members of the Botany staff of the Fort Hays Kansas State College, while studying range conditions in Western Kansas during 1940 and 1941, gave evidence that insects had killed many clumps of cactus. Short grass, consisting principally of buffalo grass, was growing over the dead pads. (Fig. 2).

In the fall of 1942, the authors became actively engaged in studying the life history of one of these insects, the cactus moth, *Melitara dentata* (Grote), in response to a request from the United States Department of Agriculture for some information about the distribution and prevalence of this insect in Western Kansas.

The request was in behalf of the State of California, who wished some live specimens of the moth in order to determine whether it could help in the control of a species of prickly pear cactus. In October 1942, a representative of the United States Department of Agriculture, Bureau of Entomology and

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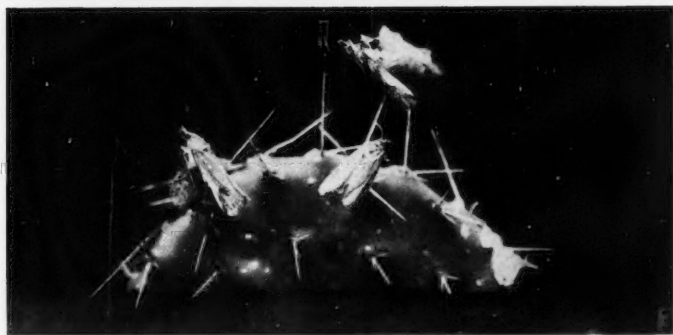


Fig. 1. A heavy infestation of prickly pear cactus in Ellis County, Kansas. July 1939.

Fig. 2. Growth of grass in cactus clumps. Many of these clumps were infested with *Melitara dentata* larvae. October 26, 1942. (Center).

Fig. 3. Moths of *Melitara dentata*, showing position when at rest. (Lower).

Plant Quarantine, came to Hays and accompanied by the authors spent a day in the field collecting larvae of the moth to send to California. The larvae were easy to find and many were collected. A search of the literature revealed that very little is known about the more detailed habits of the moth. The authors, therefore, made repeated trips into the field to make observations under natural conditions, as well as to collect material to work with in the laboratory. The study continued from the fall of 1942 to September 1943. This paper presents a summary of the results.

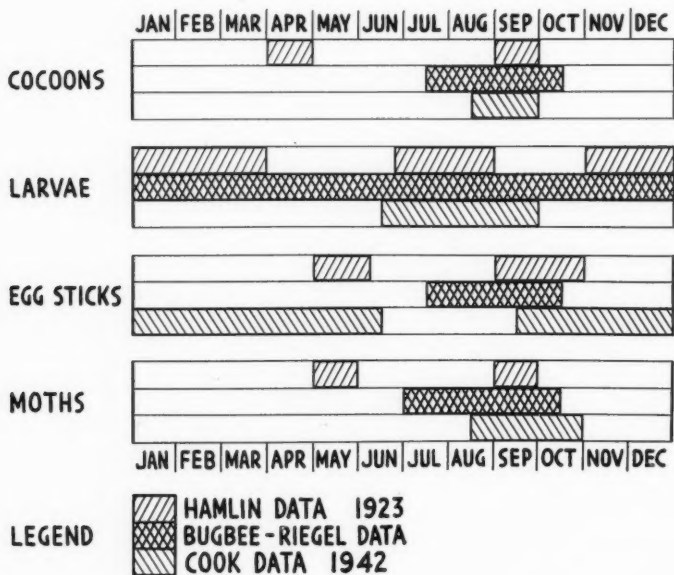
Previous references to *M. dentata* (Grote) are few. A brief description of the larva and adult is given by Kellogg (1892). Hunter, et al. (1912) note its occurrence in Colorado on *Opuntia missouriensis*. Dodd (1940) summarizes attempts to introduce the moth into Australia to combat prickly pear. The moth failed to establish itself possibly due in part to heavy rains. Cook (1942), from data collected in Western Kansas, describes the life-history of the moth, but as our results differ from his, we will refer to his work in more detail later.

### Life History

A few moths began emerging in the laboratory in late June, but in the field the bulk of the moths emerged in July and August, gradually decreasing in numbers into September and early October. Oviposition was scant in the latter part of July but reached its height in August and September. In the laboratory the adult moths lived on the average of 5 days. This disagrees with Cook (loc. cit.) who reports a life-span of from 2 to 3 weeks. The moths placed the egg sticks on the end of the spines so that the young larvae were handy to a food supply. Young larvae appeared, on the average, 8 days after oviposition throughout August, September and early October. After 2 or 3 days the young larvae chewed their way into a fresh green pad. Here they remained all winter, in a more or less dormant condition, although some activity (moving around inside the pads and deposition of frass which evidenced feeding) was observed on winter days when the temperature was well above freezing. In the spring (middle of April on) the larvae became continually active and began to increase in length and circumference. As one pad became completely hollow the larvae would chew their way out, migrate to other fresh pads nearby, and chew their way inside. The same larva or group of larvae might make several of these migrations during the summer. In late July, all of August and into September, they chewed their way out, and crawling under the old dried pads, spun cocoons. The pupal period lasted, on the average, for about 23 days (range 18-29) which completed the life-cycle. The data presented above are summarized in Chart 1 under the heading of Bugbee-Riegel Data.

The article by Cook (loc. cit.) presents a different story of the life-cycle of *M. dentata*. Instead of over-wintering as larvae he found that the moth over-wintered in the egg stage (see Cook Data, Chart 1). At first this seems like a direct contradiction of our data. However, the following observations suggest that *M. dentata* has a considerable range of adaptability as far as climatic conditions are concerned. Larvae, collected in the field by us late in

October 1942, and kept in the laboratory all winter at ordinary room temperature and humidity, proceeded to remain active and grew to pupation size by early June; a good month ahead of those in the field. Also several infested cacti placed in the college greenhouse gave the same results. Larvae observed in the field and placed in window boxes grew little if any until spring. Infested pads, examined in the field on February 8, 1943, contained larvae of about the same size as those we had collected on October 26, 1942. As late as April 7, 1943, very little growth had occurred. By May 29, 1943, however, large larvae (20-30 mm.) were collected in the field and evidence of larval migrations from old pads to fresh pads was observed. This suggests that temperature is one factor which plays an important part in determining whether the moths will over-winter as larvae or in the egg stage. An early fall may catch many still in the egg stage and a diapause condition may result until spring, or a late fall may allow the eggs to hatch and over-wintering thus occur in the larval stage. Further support for this belief is given by the data presented by Hamlin (1923) for a close relative of *M. dentata*, *M. junctolineela*, from Texas. Hamlin found that over-wintering larvae of *M. junctolineela*, transported from Uvalde, Texas, where it produced two generations a year (see Hamlin Data, Chart 1), to Brisbane, Australia, gradually "accomplished a swing-over to the opposite seasons of Australia" when three generations were produced in 16 months. According to Hubbard (1895) another closely related species, *M. prodenialis*, as well as *Cactoblastis cactorum* (Dodd, 1940), may also over-



winter as larvae in cactus pads. Taking all the above evidence we may not be surprised to find some differences in the life-cycle of *M. dentata*, studied in different years by several investigators. The final word must wait until a thorough check can be made over a longer period of years than anyone has been able to make so far.

### Additional Life History Notes

#### MOTH

The adult has been described previously (Kellogg, 1892) so that only a few observations on their behavior will be mentioned here. The moths have the highly cryptic habit of clasping a spine, and with the wings folded roof-like over the body, antennae turned back and hugging the body, they remain perfectly motionless (Fig. 3). This, combined with their drab coloration, causes them to be overlooked easily. When disturbed they fly off, on an erratic course. Their flight is strong, however, and probably has aided materially in their dissemination over most of the territory where prickly pear cactus occurs. Like *M. prodenialis* they are nocturnal and remain hidden during the day.

#### MATING

A male and female were observed mating in the laboratory on the morning of September 13, 1943. They mated by placing the end of the abdomens together so that they faced in opposite directions. Both were placed in an observation cage but immediately separated and died 5 and 7 days later without deposition of any egg sticks by the female.

#### EGG STICKS

All the egg sticks observed in the field were attached to the end of spines on fresh green pads. They were usually on the under surface of the pads where pads were close together. In many instances, the young larvae, along with the egg stick, had fallen onto the underlying pad and the larvae had chewed their way inside (Fig. 4). Occasionally two egg sticks were found on a single spine. In the laboratory, egg sticks were often deposited on the sides, or bottom of the shoe boxes in which the pads were kept. The egg sticks, when first deposited, were light brown in color and always curved. The curve is due to the fact that the moth, standing on the pad, raises the tip of the abdomen to the tip of the spine. After attaching the first egg by a cementing substance to the spine she swings the abdomen outward. The moth, remaining fixed in her original position, thus causes the abdomen to describe an arc.

The eggs themselves are flattened on each side where they abut against each other and resemble segments in an antenna. Each egg averaged about .26 mm. in length and 1.5 mm. in width. The entire surface of the stick is covered with irregular star shaped indentations and glistens as though varnished.

As the days pass the original light brown color changes to dark brown and through the thin shell can be seen the dark brown head capsules of the develop-

ing larvae. On or about the eighth day the young larvae, measuring about 2-2.5 mm. in length, begin emerging. Emergence may continue for 5 or 6 days before all have chewed their way out through neat, little, round holes. No particular order of hatching was observed, as the first larva was just as apt to come from an egg at the base of the stick as from one at or near the top of the stick.

The number of eggs in a stick varied from 21 to 50 in our specimens, although Cook (loc. cit.) states that there may be as many as 100. The per-

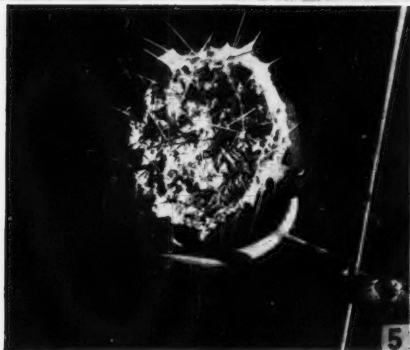


Fig. 4. Pads infested with *M. dentata* larvae, showing webbing, frass, waxy secretion of the plant and egg sticks.

Fig. 5. Cactus pad with webbing of *M. dentata* larvae along margin and on spines.



centage of hatch varied from 68 to 100 percent in the laboratory. Cook found a great variation in the percentage of emergence of moths from cocoons depending upon various ecological conditions, such as drought, etc. In the field, similar conditions would be expected to affect the percentage of hatch from the eggs also. The conditions in the laboratory were probably more nearly optimum than would be found in the field.

After the larvae have hatched, the egg cases appear almost white and easily break loose from the spine, although they may remain attached for many days before they drop to the pads and debris below.

#### LARVAE

The newly emerged larvae, averaging about 2 mm., in length, follow the egg stick to its point of attachment to the spine and make their way down to the surface of the pad. Immediately upon crawling out of the egg they begin spinning a fine thread of silk and always do so thereafter no matter how far they may travel. Other larvae, traveling the same path down the spine, soon multiply the strands of silk until a fine webbing covers the spine (Fig. 5). Having reached the surface of the pad the larvae bunch together and, although one or two may wander away, may remain so for several days. In the meantime they spin above them and below them a double carpet of silk so that within a few hours one has to look close to see them through the silk canopy. With the covering more or less complete they begin chewing on the thick epidermis, and the webbing soon becomes littered with the fine particles of green epidermis as well as the excrement of the larvae. In the field, the collection of fresh green frass, held in the web-like carpet on the surface of a pad, makes the larvae easy to find. In addition the plant itself may exude around the wound a yellowish waxy substance which collects in irregular lumps and also aids in locating infested pads (Fig. 4). The larvae gnaw neat round holes through the epidermis. In doing so they alternate gnawing with periods of rest or add more webbing above and below them. Once the epidermis is pierced the larvae tunnel the pad, usually following along the edges of the pad first and then working toward the center. The excrement is brought to the surface and added to that already in the webbing but eventually it is allowed to collect inside the pad. When the pad has been exhausted of available food it is completely hollowed out between the two layers of epidermis. The only thing that remains is a brownish, moist, mass of excrement. At this point, if the pad is a terminal one, the larvae chew their way out through the epidermis and make their exit by one or several holes. Spinning their strand of webbing behind them they move about among the nearby pads, locate a fresh one, and immediately begin to gnaw through the epidermis. If the larvae are in a pad which has other pads growing from it they will proceed to tunnel into the other pads without coming to the surface. If fruits are present they will consume them also.

Migrating larvae may all enter the same fresh pad or they may separate and seek other pads. In general, the older they become the greater the tendency to separate. Hunter et al. (1912) suggest, in the case of *M. junctolineela*, that

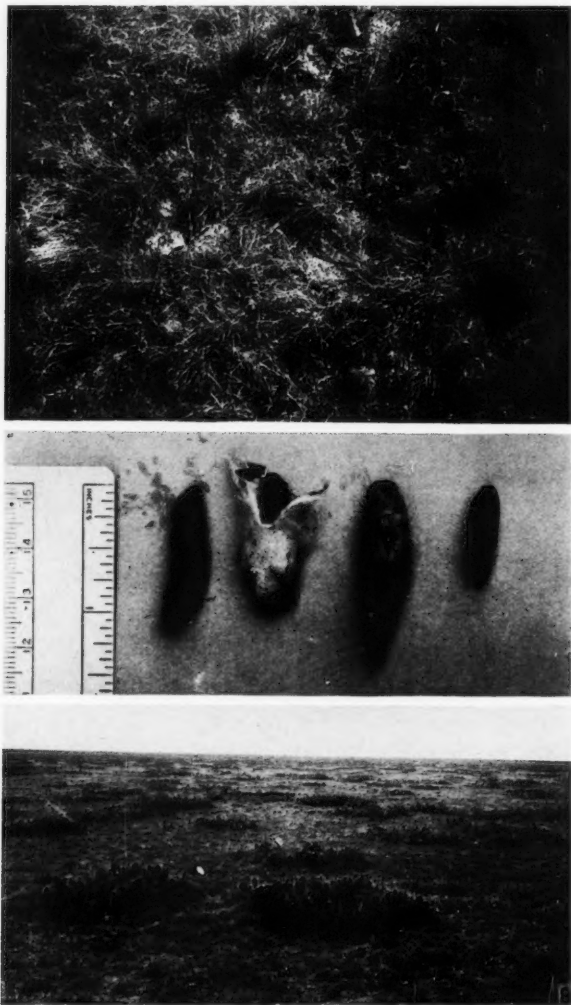


Fig. 6. Cactus plant entirely dead and being taken by grass. Death due chiefly to *M. dentata* larvae. (Upper).

Fig. 7. Larva, cocoon and pupa of *M. dentata*. (Center).

Fig. 8. Badly dusted pasture with only slight infestation of *M. dentata* larvae, 9 miles south of Dighton, Kansas, August 20, 1943. (Lower).

the reason only one or two larvae are often found in infested pads, when egg sticks contain so many eggs, may be due to cannibalism among the larvae. We found no evidence of cannibalism among larvae of *M. dentata* but did note the separation of the larvae to neighboring pads during migrations. In the laboratory larvae were observed making as many as five of these migrations before they spun cocoons. Thus larvae become disseminated in the field and infest a large percentage of pads of a single cactus plant before the summer season is over. Dodd (1940) notes the same migrating habit in the South American species *Cactoblastis cactorum* in Australia. It may be true of all *Melitara* species.

An infested pad is identified easily. In the early stage the webbing and collected frass on the surface is a sure sign. Later, after the larvae are all inside, a brown streak begins to appear and follows the general course of their tunneling operations. Still later the pad begins to appear shrivelled and turns a pale greenish gray. If it is held up to the light at this time one can see light through it and make out the shadows of the larvae themselves moving about inside. After the larvae leave the pad it becomes hard and the dried out excrement rattles around on the inside. The progress of the larvae can be followed in a patch of cactus by noting the dried up, hollow pads which eventually rot away. In general, they work from the center toward the periphery. Many cactus clumps which were completely or nearly dead because of the work of the larvae, were observed in the field (Fig. 6).

Many times the hollow pads become infested with the scavenger larvae of a species of Diptera (probably *Copestylum marginatum*). These maggots turn the remains of excrement on the inside of the pad into a brown, ill smelling, semi-liquid mass of about the consistency of molasses.

When the larvae first emerge from the egg they are about 2 mm. in length. The head capsule is dark brown and is in sharp contrast to the light brown body. As they increase in length the body becomes darker brown until it resembles the color of the head capsule. By the time they are half grown (15-20 mm.) they most often turn bluish or purplish in color. This color seems to be due to some ingredient in their food and, if crushed, they leave a distinct bluish stain. By the time they are ready to pupate they have reached a length of between 30-40 mm. (Fig. 7).

During the course of larval life the pads are completely hollowed out. By weighing fresh pads before larvae had gained entrance into them and then again after the larvae had left them, some idea of the loss of weight due to the larval feeding was ascertained. Thirty-six fresh pads were weighed before larvae gained entrance and after they had left. The pads were found to lose about 71% (range 44-88%) of their weight. After correcting this percentage for the loss due to evaporation of water it was found that the larvae accounted for about 54% (range 31-78%) of the total loss. The time which elapsed between the entrance of the larvae and their emergence depended on the size of the larvae, the size of the pads, and the number of larvae concerned. In general, the larger the larva the quicker it went through a pad; several larvae

exhausted a pad quicker than one; smaller pads were deserted in a shorter time than large ones.

The reaction of the larvae to light varies considerably. If an infested pad is opened before the larvae are ready to migrate to fresh pads they will quickly retreat into their tunnels or crawl under the pad. When they are ready to migrate they react positively to light and make no attempt to avoid it. The infested pads were kept in covered shoe boxes with the neck of a small 10 cc. bottle inserted through a hole in one end. When the larvae had exhausted the pad they would emerge and make their way to the bottle, the only source of light in the box. There they would remain until transferred to a fresh pad.

The larvae were attacked by a white fungus disease. It left their bodies mummified. Many times, on opening infested pads from which larvae should have emerged, their bodies, covered with a white powder, would be found.

#### COCOONS

In the field the larvae usually emerge from the pads and spin their cocoons under the pads next to the ground. By so doing dirt and other debris become entangled in the silk (Fig. 7). In the laboratory cocoons were spun on the top, sides and bottom of the boxes as well as on top and beneath the pads. This is a negative reaction to light and as the boxes were dark, any point was suitable for placing the cocoon. The silk is pure white, in contrast to the yellow silk of *M. prodentalis* (Hubbard, 1895). The cocoon is spindle shaped and measures about an inch to an inch and a half in length. The length of the pupal life averages 23 days, with a range of from 18-32. This average compares favorably with the statement by Cook (loc. cit.) that it takes them "approximately three weeks" to emerge.

#### ECONOMIC VALUE

No actual figures can be given as to their value in combatting the cactus. It is the writers' opinion, however, that they have reduced cactus stands by 50-75% or more in areas observed around Hays, Kansas. Cook (loc. cit.) credits them with almost total destruction of the cactus where there was considerable undergrowth and adequate moisture such as one would find in a well managed pasture (as opposed to an overgrazed pasture). It was the authors' experience that cactus, in an overgrazed pasture where considerable dusting may have occurred, never yielded many infested pads (Fig. 8). In well managed pastures, it was not unusual to find 50-75% of the cactus clumps infested (Fig. 2). After the drought of 1933-40, in which infestation was at a low ebb, the moths came back in ever increasing numbers and have been much in evidence since. Thus, given adequate cover, plus rainfall, the writers believe that the larvae of *M. dentata* can serve as a very material check on the prickly pear cactus in the short grass range lands. Their apparent wide range of adaptability to climatic conditions further assures, that, even though periods may be unfavorable, they will survive and soon be strong enough in numbers to serve as a potent check.

## REFERENCES

1. COOK, C. W. 1942—Insects and weather as they influence growth of cactus on the central great plains. *Ecology* **23**(2):209-214.
2. DODD, A. P. 1940—The Biological campaign against prickly-pear. Publication of the Commonwealth Prickly Pear Board, Brisbane, Australia.
3. HAMLIN, J. C. 1923—Seasonal adaptation of a northern hemisphere insect to the southern hemisphere. *Journ. Econ. Ent.* **16**:420-423.
4. HUBBARD, H. G. 1892—The oviposition of *Melittara prodenialis* Walker. *Proc. Ent. Soc. Washington* **3**:120-132.
5. HUNTER, W. D., PRATT, F. C. AND MITCHELL, J. D. 1912—The principal cactus insects of the United States. U. S. Dept. Agri., Bur. Ent., Bull. **113**:1-71.
6. KELLOGG, V. L. 1892—Notes on *Melittara dentata* Grote. *Kansas Univ. Quarterly* **1**(1):39-41.

## Studies in *Penstemon*—VIII

### A Cyto-taxonomic Account of the Section *Spermunculus*

David D. Keck

Since 1927, the writer has had a sustained interest in the taxonomy of the genus *Penstemon*. Many other studies have intervened and a projected monograph of it has been postponed indefinitely. Other groups of plants have proved to be more suitable for combined cytogenetic and morphologic-geographic investigations at this laboratory, aiming to disclose the complex organization of natural units within a genus; and cooperative studies along these lines take precedence here. Nevertheless, through the gradual accretion of information on *Penstemon*, the writer has now an over-all view of the organization of this genus. The present paper treats by far the largest section, and its species have been among the most confused and least understood of all. There remains only the interpretation of some twenty Mexican species before a synopsis of the whole genus can be presented.

Those units are considered as species, which, on the basis of the morphology and distribution of their components, appear to be separated from other such units by genetic barriers that prevent the free flow of genes from one to the other. Geographically and morphologically separable facies of such units that obviously interbreed freely at their points of contact are treated as subspecies. Mere geographic isolation, if unaccompanied by a genetic barrier, is not considered sufficient basis for recognizing species.

For *Penstemon*, a background of chromosome numbers has been available in addition to the usual analysis through comparative morphology and geographical ecology. Also, a number of the species have been cultivated in the garden and studied in the field. The natural units were determined by morphology, distribution, and chromosome number (which is indicative of the presence of barriers to interbreeding), and are reasonably clear in this genus of sexual species. But the recognition of these units as species or subspecies depends upon the degree of observed morphologic intergradation or distinctness, and upon the coordinate ranking of groups of unknown chromosome number with like groups whose number has been determined.

Lacking experimental evidence, one inclines to retain as species a few more natural units than may ultimately prove to have adequate genetic barriers to interbreeding and hence a true natural basis for specific status. This is shown in the present paper, where more species of obvious close relationship occupy a series of environments than are ordinarily found in those genera whose species have been delimited by experiment. Nevertheless, the natural units recognized here as species are of a degree of observed distinctness which would make their amalgamation into compound units a hazardous affair and would obscure the true relationships that experiments may some day disclose.



The cytological investigation, for instance, has shown the necessity of separating *P. shastensis* and *P. pratensis*, tetraploid species, from *P. heterodoxus* and *P. oreocharis*, their respective diploid counterparts with which they are closely related morphologically. These and other instances give clues as to the specific lines found here; but on the other side of the ledger one is cautioned by the result of field tabulations on a hybrid swarm between two diploid members of the section *Erianthera*, namely, *P. Menziesii* Hook. and *P. Newberryi* A. Gray, which are morphologically very distinct, but which, nevertheless, seem to have almost no genetic barrier between them (Clausen, Keck, and Hiesey, 1940, pp. 282-286).

In the present work a conscious attempt is made to lay a groundwork for future experimental studies, but to date insufficient material of some of the species has been studied and for this reason all the possible ecotypes within them can not yet be predicted.

### Synopsis of the Genus

A survey of the entire genus following the principles mentioned above discloses some 225 to 235 species. With one exception these are confined to North America, with the great majority in the western United States. Pennell (1935) states: "This is the largest Nearctic genus of Scrophulariaceae, presenting in the form and color of the corolla an amount of difference perhaps unequaled elsewhere among flowering plants." In a genus of this size, subgeneric, sectional, and subsectional names are of importance as they mark convenient subgroups. This paper is not the place to discuss the framework of the genus in detail, for it is necessary to coin several sectional names in the presentation of the larger groups. Therefore, attention is focused here on the groups treated on later pages.

*Penstemon* can be divided into half a dozen subgenera on the basis of major morphological differences. By far the largest of these is the subgenus *Eupenstemon*, containing about 78 per cent of all the species. *Eupenstemon*, in turn, is divisible into about twelve sections, of quite unequal size, varying from one that is monotypic and several that contain few species each, to the section *Spermunculus*, with some 56 species. It is suspected that *Eupenstemon* contains a minimum of three comparia (groups of species that can be linked together by hybridization even though the hybrids may be sterile), with a possibility that there are as many as eight, and that each of the sections is on the order of one or more distinct cenospecies. In fact, experimentation is more apt to demonstrate that a greater rather than a lesser number of comparia and cenospecies than this exist in *Eupenstemon*.

The section *Spermunculus* (cf. fig. 5, p. 139) is here considered to contain nine subsections as follows: the *Proceri*, with 20 species, and the *Humiles*, with 14, which together form the basis of the present paper; the *Graciles*, with about a dozen species, all but one of which were treated in some detail by Pennell in his Scrophulariaceae of Eastern Temperate North America, and so that account is merely supplemented here; the *Tubaeflori* and *Multiflori*, monotypics also covered by Pennell in that monograph; the *Harbouriana*, an

additional monotypic of the central Rocky Mountains; and finally, the *Deusti*, *Arenarii*, and *Gairdnerani*, subsections treated by the writer in a previous paper (Keck, 1940).

### Evolution within the Section *Spermunculus*

From their own experimental data and from a survey of the considerable literature on experimental polyploidy, Clausen, Keck, and Hiesey (in press) have developed the theory that plant groups follow an evolutionary sequence from flexible to inflexible. In the early evolutionary stages of a group, ecotypes emerge following ecologic isolation; then, as genetic barriers to interbreeding develop, these give rise to ecospecies. During these stages the gene is the significant building block for evolution, and variation may greatly increase through hybridization, mutation, and selection. Then, as closely related forms disappear and the genetic gaps become wider, different cenospecies emerge which are unable to exchange genes further unless new species arise de novo through amphiploidy. This process is a principal method of introducing polyploidy into their chromosome numbers. Genera that have reached this stage of development, in which the genome or entire set of chromosomes rather than the individual gene is the important building block, are genetically quite mature and ready to decline from lack of rejuvenation as their opportunities decrease for obtaining new supplies of genes through hybridization. Genera in which apomixis has set in are probably the most mature of all.

Representatives of all stages of the sequence are readily found. The genus *Aquilegia* is believed to represent a youthful stage as regards genetic constitution. (It may be older in terms of time than some genera that are genetically more mature.) It exhibits great morphological diversity and geographical spread, but genetically it contains few well separated ecospecies and many well marked ecotypes. All its forms are on one chromosome level, and experiments indicate that *Aquilegia* is too immature to develop polyploidy successfully.

The subgenera and sections of *Penstemon* appear to be scarcely more advanced genetically than the genus *Aquilegia*. All but two of the species thus far investigated are members of an 8-series, and the great majority are diploid. The two exceptions are *Penstemon nemorosus* (Dougl.) Trautv.,  $n=15$ , of our Pacific Coast states, and *P. frutescens* Lamb., of Japan northward, the only Asiatic species,  $n=20$  (Sakai, 1934). The latter two are somewhat related, and their chromosome numbers suggest that they may represent the end-points of a 5-series, which now must be limited to very few species. Polyploidy is uncommon, apparently being almost limited to two sections, *Spermunculus* and *Eusaccanthera*, and found, with four exceptions, only on the tetraploid and hexaploid levels. In the latter section there is strong circumstantial evidence for the amphiploid origin of *P. neotericus* Keck (Clausen, 1933). This pattern of evolution seems to have been followed by several species in the genus. In other instances, autopolyploidy has probably played a role in the speciation.

*Penstemon attenuatus* Dougl. ex Lindl., as an example, is a hexaploid species ( $n=24$ ) that is quite highly variable. It is divisible into three well-

marked regional subspecies, plus a fourth of a more incipient nature. One may suspect from a summation of the data that the three principal subspecies may have arisen independently through amphiploidy, having perhaps only one parental species in common, and then been able to hybridize readily when on the hexaploid level. In order to produce a hexaploid species, one parent must have been diploid and the other tetraploid. There are such species now growing near together in the area occupied by *attenuatus*, that could conceivably give just the combinations of characters found in its subspecies if their genomes were added together in amphiploidy. The variation in *attenuatus* together with the observation of multivalent chromosomes in meiosis, suggests that some pairing may be taking place between the chromosomes of the progenitors, and that this is the sort of amphiploid which can arise between ecospices of one cenospices rather than between members of distinct cenospices.

Similar secondary association of chromosomes at meiosis has been observed in two tetraploids, *P. confertus* Dougl. ap. Lindl. and *P. subseratus* Penn., neither of which is believed to be of autopolyploid origin. In other words, *Penstemon* appears to have made a beginning at species building through amphiploidy, although as a whole its species are probably not far enough differentiated genetically to allow this course to proceed very far. The genus is still genetically young.

#### Cytological Observations

The first report on chromosome numbers in *Penstemon* covered eight species and was made by Winge (1925). Three of these interest us here. One member of the *Humiles*, *P. ovatus*, was found to be diploid,  $n=8$ , and two species of subsection *Graciles* are reported, namely, *P. hirsutus*,  $n=8$ , and *P. laevigatus* var. *Digitalis*,  $n=48$ . All three of these counts we have substantiated in other material. The dodecaploid nature of *P. laevigatus* is indeed surprising, as no other *Penstemon* is known in the subgenus *Eupenstemon* with more than half as many chromosomes (hexaploid). La Cour (1931) also reports  $n=48$  chromosomes in *P. laevigatus*, and in a clear microphotograph of first metaphase of meiosis "secondary pairing" is distinctly shown. If this species is of amphiploid origin, such pairing indicates considerable cytological relationship between the parental chromosomes. "Secondary pairing" is characteristic of other polyploids we have investigated in the section *Spermunculus*.

Chromosome counts have been made of 22 of the 34 species recognized in the subsections *Proceri* and *Humiles*. Some of these have already been published by collections (Clausen, Keck, and Hiesey, 1940), but as the critical taxonomic work had not been done at that time, a relisting is given below in order to bring those cytological data into conformity with the present treatment and to interpolate many new counts. Changes in determination between the 1940 list and the present one are indicated. The chromosome illustrations were made from those collections that are marked with an asterisk.

Three of the 22 species in the following list have two chromosome numbers, namely, *P. procerus*, *cinicola*, and *Wilcoxii*. The presence of geographically distinct chromosome races in *procerus* seems fairly clear (these are not morphologically distinct on the present evidence); the cytological picture

within *Wilcoxii* is more confused; and the situation in *cinicola* can be clarified only with more data than are available.

These cytological studies were made on sectioned material. Fixations were made either in the field or in the garden of plants grown from seed collected in the wild. The earlier counts were made by my colleague, Dr. Jens Clausen, who also had a first-hand knowledge of Winge's material. I am grateful to him not only for cytological help and the opportunity of using his drawings as the basis for a number of the chromosome illustrations in this paper, but also for a critical reading of the manuscript. I am also grateful to a number of correspondents for supplying materials, particularly Mr. Frank H. Rose, Missoula, Montana, Mr. Harold M. Tucker, Caldwell, Idaho, and Mrs. Gladys Nisbet, Springer, New Mexico, for living plants and seeds.

#### SUBSECTION PROCERI

##### *Penstemon procerus* ssp. *typicus*:

###### Diploid forms:

Keck & Clausen 3643, 6 mi. W. of Unity, Baker Co., Oregon,  $n = 8$  (second metaphase).

\*Keck & Clausen 3652, 10 mi. E. of Austin, Grant Co., Oregon,  $n = 8$  (first metaphase and diaphase).

###### Tetraploid forms:

3845-1, W. side Flathead Lake, Montana,  $2n = 32$  (roottip).

3845-2, same,  $2n = 32$  (roottip).

\*3792-1, Hoback Canyon, Teton Co., Wyoming,  $2n = 32$  (roottip).

3792-2, same,  $2n = 32$  (roottip).

Keck 896, Camp, Jackson Co., Colorado,  $n = 16$  (first metaphase, some quadrivalents). Intermediate to *Rydbergii typicus*, and possibly better referable to that species.

##### *Penstemon procerus* ssp. *aberrans*:

\*1251-1, 5 mi. W. of Puffer Lake, Beaver Co., Utah,  $n = 8$  (first metaphase).

1251-2, Cottonwood Canyon, E. of Fairfield, San Pete Co., Utah,  $n = 8$  (diaphase and interphase).

##### *Penstemon Tolmiei* ssp. *brachyanthus*<sup>1</sup>:

\*1252-1, Mt. Hood, Oregon,  $2n = 16$  (roottip).

##### *Penstemon oreocharis* (listed in 1940 under *P. procerus*):

Keck & Clausen 3534, Liberty, Kittitas Co., Washington,  $2n = 16$  (ovary wall).

Keck & Clausen 3622, 3 mi. S. of Baker, Baker Co., Oregon,  $n = 8$  (diaphase).

\*Keck & Clausen 3691, Lapine, Deschutes Co., Oregon,  $n = 8$  (diaphase, first and second metaphases).

Keck & Clausen 3693, Paulina Marsh, near Silver Lake, Lake Co., Oregon,  $2n = 16$  (ovary wall).

1249-11, Farringtons, near Leevining, Mono Co., California,  $2n = 16$  (roottip).

1247-2, Tuolumne Meadows, Tuolumne Co., California,  $2n = \text{ca. } 16$  (ovule).

\*1244-4, Aspen Valley, Tuolumne Co.,  $n = 8$  (first metaphase).

1245-1, same,  $n = 8$  (first metaphase).

1243-4, Miguel Meadow, Tuolumne Co.,  $2n = 16$  (corolla).

##### *Penstemon heterodoxus* ssp. *typicus* (listed in 1940 under *P. procerus*):

F. 1821-2 (Clausen), Slate Creek Valley, Mono Co., California,  $n = 8$  (first anaphase).

<sup>1</sup> The plant 1017-2, listed in 1940 under *procerus*, from East Lake, Paulina Mts., Deschutes Co., Oregon,  $n = 8$ , is probably referable to this, but it died in our garden before it could flower.

1248-1, Tioga Pass, Mono-Tuolumne counties,  $2n = 16$  (ovary).

\*1248-2, same,  $2n = 16$  (roottip).

*Penstemon heterodoxus* ssp. *cephalophorus* (listed in 1940 under *P. procerus*):

\*1246-1, Mineral King, Tulare Co., California,  $n = 8$  (first metaphase).

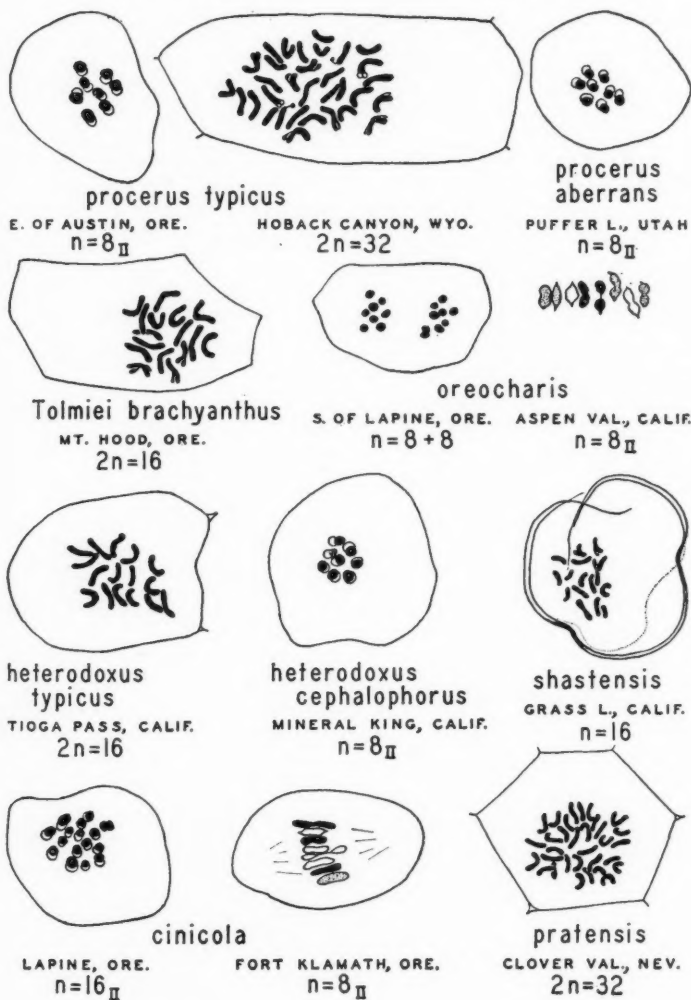


Fig. 1. Chromosomes of some species of subsection *Proceri*.  $\times 2000$ .

*Penstemon shastensis*:

\*Keck 5172, Grass Lake, Siskiyou Co., California,  $n = 16$  (pollen divisions).

*Penstemon cinicola*:

## Tetraploid form:

\*Keck & Clausen 3690, Lapine, Deschutes Co., Oregon,  $n = 16$  (first metaphase, chromosomes densely glomerated; first anaphase).

Keck 5183, Gilchrist, Klamath Co., Oregon,  $2n = ca. 32$  (sepal).

## Diploid form:

\*Keck 5179, Fort Klamath, Klamath Co.,  $n = 8$  (first metaphase and interphase).

*Penstemon pratensis* (listed in 1940 under *P. procerus*):

\*1249-1, Clover Valley, 12 mi. S. of Wells, Elko Co., Nevada,  $2n = 32$  (roottip).

*Penstemon Rydbergii* ssp. *aggregatus* (listed in 1940 under *P. aggregatus*):

\*1240-2, 5 mi. S. of Salina Experiment Station, Sevier Co., Utah,  $2n = 32$  (ovary wall).

*Penstemon globosus*:

\*1239-4, Wallowa River, above Wallowa Lake, Wallowa Co., Oregon,  $2n = 32$  (roottip and ovary wall).

*Penstemon euglaucus*:

\*1237-1, 4 mi. from Cloud Cap Inn, Mt. Hood, Oregon,  $2n = 48$  (roottip).

\*Keck 5192, S. of Cooper Spur, Mt. Hood,  $n = 24$  (first metaphase).

*Penstemon attenuatus* ssp. *typicus*:

\*Keck 5342, Kamiak Butte, Whitman Co., Washington, yellow-flowered,  $n = ca. 24$  (first metaphase, multivalent association).

Keck & Clausen 3600, Emigrant Springs State Park, Umatilla Co., Oregon, purplish blue-flowered,  $n = 24$  (second metaphase).

Keck & Clausen 3601, summit Emigrant Hill, ditto,  $n = 24$  ( $23_{11} + 2_1$ ) (first metaphase, multivalent association; tetrads regular).

*Penstemon attenuatus* ssp. *pseudoprocerus*:

3793-1, Hoback Canyon, Teton Co., Wyoming,  $2n = 48$  (roottip).

\*3793-2, same,  $2n = 48$  (roottip).

*Penstemon confertus*:

3844-2, W. side Flathead Lake, Montana,  $2n = 32$  (roottip).

\*1242-2, Meacham, Umatilla Co., Oregon,  $n = 16$  (first metaphase, multivalent association).

Keck & Clausen 3605, 5 mi. N.W. of Meacham,  $n = 16$  (first metaphase).

Keck & Clausen 3605a, same,  $n = 16$  (first metaphase, multivalent association).

*Penstemon flavescens*:

\*3846-1, Elk Summit, Idaho Co., Idaho,  $2n = 48$  (roottip).

3846-3, same,  $2n = ca. 48$  (roottip).

## SUBSECTION HUMILES

*Penstemon pruinosus*:

\*Keck & Clausen 3570, 4 mi. S. of Lind, Adams Co., Washington,  $2n = 16$  (ovule and receptacle).

*Penstemon albertinus*:

4006-1, Hill 36 Lookout, St. Joe Mts., Shoshone Co., Idaho,  $2n = 16$  (roottip).

\*4006-2, same,  $2n = 16$  (roottip).

3854-3, head of Brushy Creek, Montana-Idaho divide, Clearwater Co., Idaho,  $2n = 16$  (roottip).

1234-1, Montana, without specific locality,  $2n = 16$  (roottip).

3834-1, Waterworks Hill, Missoula, Montana,  $2n = 16$  (roottip).

*Penstemon Wilcoxii*:

## Diploid forms:

4007-1, Mission Creek, below St. Mary's Lake, Lake Co., Montana,  $2n = 16$  (roottip). This form has pilose stems.



\*4007-2, same,  $2n = 16$  (roottip).

\*3855-2, Payette Lake, Valley Co., Idaho,  $2n = 16$  (roottip). This form is referable to *P. leptophyllus* Rydb.

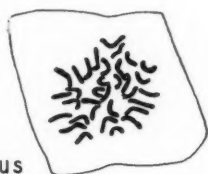
3855-3, same,  $2n = 16$  (roottip).



*Rydbergii aggregatus*

SEVIER CO., UTAH

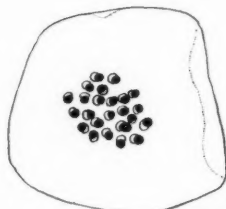
$2n=32$



*globosus*

WALLOWA L., ORE.

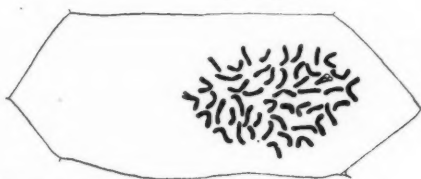
$2n=32$



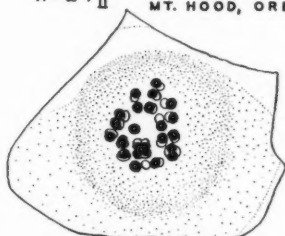
$n=24_{II}$

*euglaucus*

MT. HOOD, ORE.



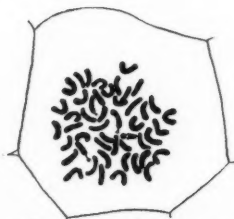
$2n=48$



*attenuatus typicus*

KAMIAK BUTTE, WASH.

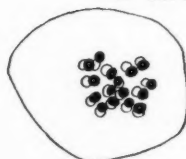
$n=ca. 24_{II}$



*attenuatus pseudoprocerus*

HOBACK CANYON, WYO.

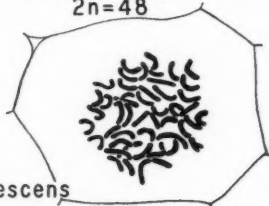
$2n=48$



*confertus*

MEACHAM, ORE.

$n=16_{II}$



*flavescent*

ELK SUMMIT, IDAHO

$2n=48$

Fig. 2. Chromosomes of some species of subsection *Proceri*,  $\times 2000$ .

## Tetraploid forms:

- 3832-1, 12 mi. E. of Missoula, Missoula Co., Montana,  $2n = 32$ , (roottip).  
 \*3832-2, same,  $2n = 32$  (roottip).  
 3832-3, same,  $2n = 32$  (roottip).  
 3850-1, Montana, without specific locality,  $2n = 32$  (roottip).  
 3852-4, Cedars, Lochsa River, "Clearwater" (Idaho) Co., Idaho,  $2n = 32$  (roottip).  
 S.344-1, Latah Co., Idaho,  $2n = ca. 32$  (roottip).

*Penstemon ovatus*:

- 1233-1, Cape Horn, Skamania Co., Washington,  $2n = 16$  (roottip).  
 \*1233-2, same,  $n = 8$  (first and second metaphase, first anaphase).

*Penstemon subserratus* (listed in 1940 as *pinetorum* form of *P. Wilcoxii*):

- Keck & Clausen 3486, 4 mi. N.E. of Goldendale, Klickitat Co., Washington,  $n = 16$  (first metaphase, no quadrivalents).  
 1236-1, Bingen, Klickitat Co.,  $n = ca. 16$  (first and second metaphases).  
 \*Keck 5194, Sherwood Forest Camp, Mt. Hood, Oregon,  $n = 16$  (first metaphase, chromosomes clumped, some secondary association).

*Penstemon Rattanii* ssp. *typicus*:

- \*Keck & Clausen 3410, 4 mi. N. of mouth of Rogue River, Curry Co., Oregon,  $n = 8$  (first metaphase).

*Penstemon Rattanii* ssp. *Kleei*:

- \*Keck 4569, Mt. Madonna, Santa Clara Co., California,  $n = 8$  (first metaphase).

*Penstemon anguineus* (listed in 1940 as *P. minor*):

- \*1235-1, Mt. Ashland, Jackson Co., Oregon,  $n = 8$  (first anaphase).

*Penstemon cinereus* ssp. *typicus*:

- \*Keck 5174, 9 mi. S. of Macdoel, Siskiyou Co., California,  $n = 8$  (pollen divisions);  $2n = 16$  (ovary wall).  
 Keck & Clausen 3684, Bend, Deschutes Co., Oregon,  $n = 8$  (diaphase);  $2n = 16$  (corolla).

*Penstemon cinereus* ssp. *foliolatus*:

- S. 342, near Glenwood, Klickitat Co., Washington,  $n = 8$  (diaphase, first metaphase).  
 \*Keck & Clausen 3657, E. of Dixie Pass, Grant Co., Oregon,  $n = 8$  (first metaphase and anaphase). (Listed in 1940 as *P. humilis*).  
 Keck & Clausen 3662, W. of Dixie Pass, ditto,  $n = 8$  (first metaphase and anaphase). (Listed in 1940 as *P. humilis*).

*Penstemon virens*:

- \*1241-1, 10 mi. S. of Colorado Springs, El Paso Co., Colorado,  $n = 8$  (first metaphase).

## SUBSECTION GRACILES

*Penstemon gracilis*:

- \*4004-1, Sierra Grande Mt., near Des Moines, Union Co., N.M.,  $2n = 16$  (roottip).  
 4004-2, same,  $2n = 16$  (roottip).

*Penstemon oliganthus*:

- \*4005-1, Eagle Nest Lake, Colfax Co., N. M.,  $2n = 16$  (roottip).  
 4005-2, same,  $2n = 16$  (roottip).

In order to aid the reader to grasp the chromosomal situation more quickly, to indicate at a glance which species remain to be cytologically investigated, and to suggest the probable relationships of the species insofar as these can be determined from morphologic, cytologic, and ecologic data without the benefit of supporting genetic experiments, the species are assembled in figure 5. This chart indicates possible connections between species, the limits of the subsections, and affinities with related sections.

Phylogenetic schemes worked out on the basis of morphology and distribution alone, when placed on paper, always take on a finality that belies their ephemeral value, for almost each decision is but one choice among often

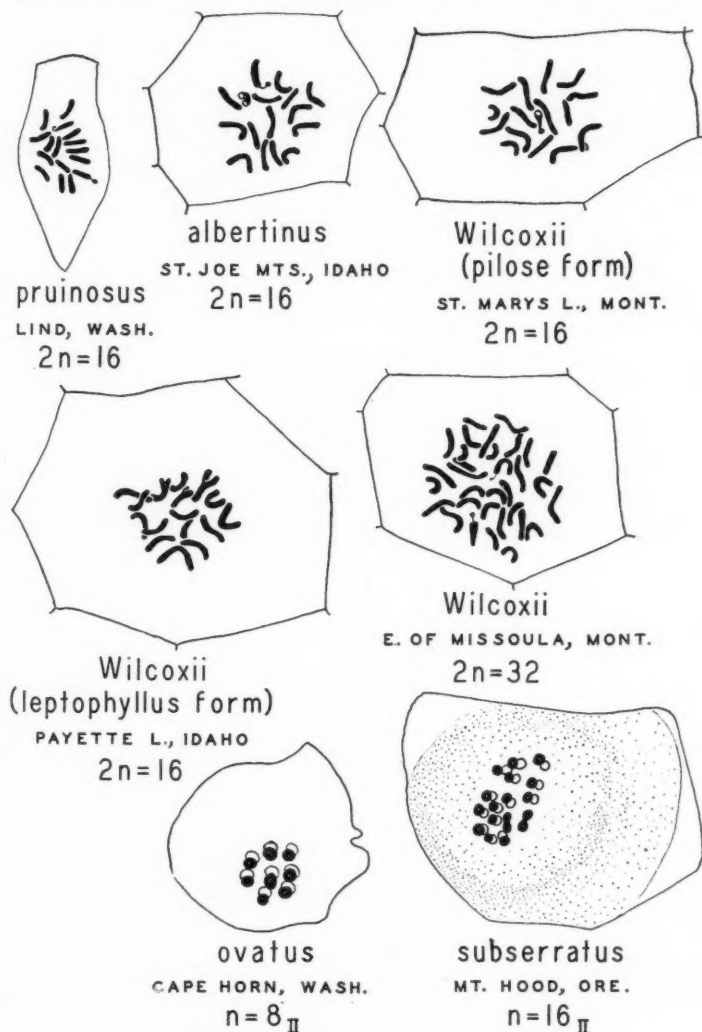


Fig. 3. Chromosomes of some species of subsection *Humiles*.  $\times 2300$ .

several alternatives that could be suggested. Even with the addition of chromosome numbers, which narrows the choices one can make, it is often quite impossible without experimental data to decide, for example in the case of polyploids, whether a certain form is an amphiploid or an autopoloid.

Figure 5 is a suggestive arrangement only, in which a few points deserve special mention. From its morphology, chromosome number, and distribution, *Penstemon shastensis* appears to be a possible autopoloid derivative of *P. heterodoxus*, and it is the only species in the *Proceri* and *Humiles* of which such an origin is suspected. In the subsection *Deusti*, however, there is probably another. Since the time when I published a revision of that group (1940), I have had material of *P. variabilis* Suksd., from Cow Canyon, Wasco Co., Oregon (Keck 5185), which was tetraploid,  $n=16$ . All other counted forms of *deustus*, to which *variabilis* had been referred as a subspecies in my revision, are diploid,  $n=8$ . Therefore, *P. variabilis* should again be accorded specific

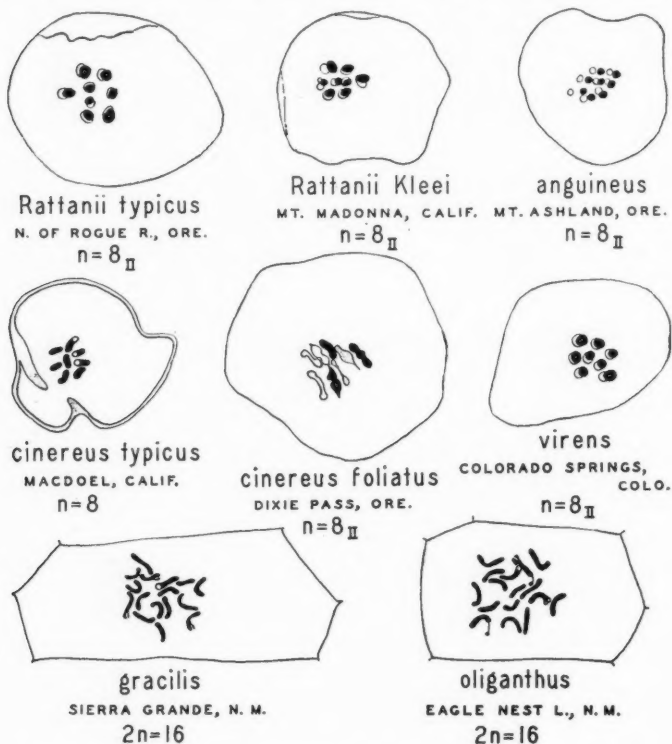


Fig. 4. Chromosomes of some species of subsections *Humiles* and *Graciles*.  $\times 2000$ .

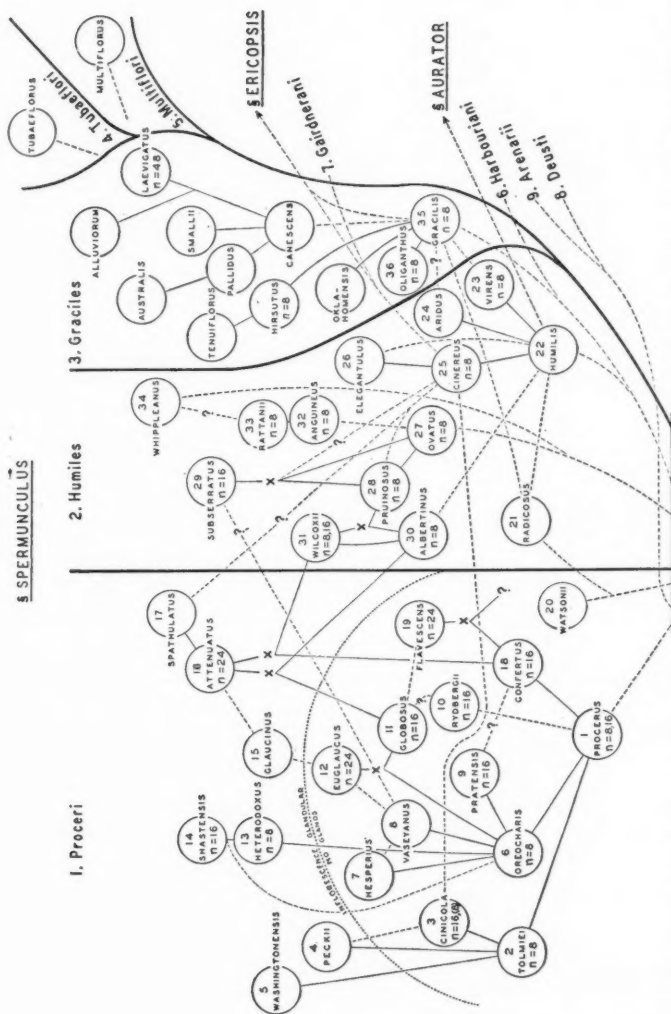


Fig. 5. Relationship diagram of the section *Spermunculus* showing affinities, possible origins, and some chromosome numbers of the species in five subsections. Broken lines indicate more questionable affinities than the unbroken ones. The species are numbered the same as in the text.

ranking. But because of its considerable morphological similarity to *deustus*, it seems likely that it is an autopoloid of that species.

Again referring to figure 5, *P. euglaucus*, *P. attenuatus*, *P. flavescens*, *P. subseratus*, and tetraploid *P. Wilcoxii* are all thought to be amphiploids for which there is strong circumstantial evidence pointing to one or both possible parents. The other polyploids here are also probable amphiploids, but their parentage is more obscure. *Penstemon flavescens* is a hexaploid that must have had the tetraploid *P. confertus* as one parent. However, its diploid parent should have characters similar to *P. globosus*, which is a tetraploid. The conclusion is therefore reached that probably one diploid ancestor is unknown in the present flora. In spite of the wealth of forms that occupy most of the available niches, it is likely that already there has been a depletion of forms in the section *Spermunculus*.

### Materials Studied

For the present study, the material in the following herbaria has been examined. Only types or a very limited part of the collections were seen in those herbaria marked with an asterisk. To the curators of all these collections, who so willingly made them available to me, I wish to express my gratitude.

- C—University of California, Berkeley.
- CAS—California Academy of Sciences, San Francisco.
- CI—Carnegie Institution of Washington, Stanford University, Calif.
- GH—Gray Herbarium, Harvard University.\*
- ND—Greene Herbarium, University of Notre Dame, Notre Dame, Ind.\*
- NY—New York Botanical Garden.\*
- Ph—Academy of Natural Sciences, Philadelphia.\*
- Po—Pomona College, Claremont, Calif.
- Pul—State College of Washington, Pullman.
- RM—Rocky Mountain Herbarium, University of Wyoming, Laramie.\*
- SU—Dudley Herbarium, Stanford University, Calif.
- US—United States National Herbarium, Washington, D. C.\*
- UW—University of Washington, Seattle.

### Treatment of Species

With the section *Eupenstemon* Benth. recently elevated to subgeneric rank, it becomes necessary to find a name for the section that includes the type of the genus. The name proposed calls attention to the small seeds, which are an outstanding feature of this group within the genus.

### *Spermunculus* sect. nov.

Corollae violaceae caeruleae albiae v. ochroleucae, haud rubrae v. coccineae, tubus elongatus cylindraceus, superne saepe ampliatus, fauce intus ± villosa et 2-plicata. Antherarum loculi late divaricati plerumque glabri et cymbaeformes; staminodium plerumque prominenter barbatum. Semina numerosa, minima. Folia integerrima v. serrato-dentata, distincta.

Perennial herbs or shrubs; stems erect or slightly decumbent at base, leafy; inflorescence an interrupted strict thyrus, or sometimes more open;



corolla narrowly tubular to ampliate, usually bearded at palate and  $\pm$  obviously 2-ridged on floor of throat; anther-sacs usually boat-shaped (not peltately explanate); seeds mostly much less than 1.5 mm. long. Type species, *P. laevigatus* Sol.

## SYNOPTICAL KEY TO THE SUBSECTIONS

- A. Plants with aerial caudex.
  - B. Suffrutescent at base only, or herbaceous.
    - C. Leaves all opposite, linear-lanceolate to broadly ovate, flat or folded but never revolute.
      - D. Anther-sacs dehiscent throughout or nearly so; inflorescence more compact.
        - E. Corolla  $\pm$  villous but never glandular within.
          - F. Suffrutescent at base or sometimes nearly herbaceous throughout; leaves usually smaller; corolla mostly darker (if white or yellow not tinged with anthocyanin); anther-sacs mostly ovate; seeds mostly more than 1 mm. long, not apiculate-thickened at attachment end. Rocky Mountains westward.
            - G. Leaves very entire (sometimes  $\pm$  toothed in *attenuatus* and *Vaseyanus*); inflorescence of compact many-flowered verticillasters, glabrous or glandular; corolla not paler within nor obviously marked with guide lines, usually obscurely bilabiate.....1. *Proceri*
            - GG. Leaves  $\pm$  serrate or toothed in most; inflorescence of rather loose verticillasters, or the cymules few-flowered, always glandular-pubescent; corolla paler within throat and  $\pm$  marked with guide lines of deeper color, usually obviously bilabiate.....2. *Humiles*
            - FF. Herbaceous throughout; leaves ample,  $\pm$  toothed; corolla white or pale blue or blue-purple, much paler within throat, ridged within, rather strongly bilabiate; anther-sacs mostly oblong; seeds small, often apiculate-thickened at the attachment end. Mostly east of the Rocky Mountains .....3. *Graciles*
            - EE. Corolla glandular within, white; leaves ample, entire or obscurely crenate-serrulate .....4. *Tubaeiflora*
            - DD. Anther-sacs dehiscent across apices, the free ends remaining pouch-like; inflorescence open-paniculate; corolla white .....5. *Multiiflora*
            - CC. Leaves alternate or opposite, linear, entire, revolute; suffrutescent; inflorescence glandular; corolla not villous nor ridged but glabrous or glandular within; anther-sacs not explanate .....7. *Cairdnerani*
            - BB. Shrubby, caudex obviously woody at base; leaves serrate, coriaceous; inflorescence glandular; corolla often glandular within, narrowly tubular, whitish or yellowish; anther-sacs broadly ovate,  $\pm$  explanate .....8. *Deustii*
    - AA. Plants with buried caudex, fibrous rootstocks, and no rosette; inflorescence leafy; anther-sacs broadly ovate, explanate.
      - H. Plants of alpine rock slides, often extensively repent, up to 10 cm. high; herbage green,  $\pm$  retrorsely canescent; corolla strongly ridged within, strongly 2-lipped, glandular without .....6. *Harbouriani*
      - HH. Plants of desert sand dunes; herbage pallid, glabrate; corolla moderately ridged within, obscurely 2-lipped, not glandular.....9. *Arenarii*

## SUBSECTION 1. PROCERI

Plants usually forming small mats, the stems arising from rosettes terminating slender scarcely suffrutescent rootstocks, or the rosettes sometimes weakly developed or the stems arising directly in clumps from a more suffrutescent root-crown (*cinicola*, *Watsonii*), the stems usually glabrous or obscurely puberulent; leaves entire (rarely toothed in *attenuatus* and *Vaseyanus*) and glabrous; thyrsus of dense many-flowered verticillasters  $\pm$  confluent above and more remote below, rarely leafy-bracted; calyx-lobes often anthocyanous, par-

ticularly on the scarious margin; corolla exceeding 18 mm. in length only in *globosus* and *attenuatus*, obscurely bilabiate, the throat rounded or 2-ridged, never strongly plicate or strongly ampliate; anther-sacs less than 1 mm. long, opposite or nearly so, glabrous or at most microscopically muriculate along margin of suture; staminode  $\pm$  included, bearded only at apex or for most of its length; capsule ovoid, glabrous, shiny.

#### NATURAL KEY TO THE SPECIES OF THE SUBSECTION PROCERI

- A. Calyx more than 3.5 mm. high and basal rosette well developed, or if not one or the other the corolla less than 12 mm. long.
  - B. Corolla not yellow, or if yellow the inflorescence glandular (except in a form of *Tolmiei*); bracts of the inflorescence not scarious-margined nor erose.
    - C. Corolla 6-10 mm. long (to 11 mm. in *washingtonensis*),  $\pm$  declined; anther-sacs rotund, essentially explanate, mostly 0.5 mm. or less long.
      - D. Inflorescence not at all glandular.
        - E. Leaf-blades lanceolate or wider, not recurved.
          - Basal rosette feebly developed; calyx-lobes caudate-tipped, 3-6 mm. long. ....1. *P. procerus*
          - Basal rosette well developed; calyx-lobes caudate-tipped only in *typicus*, usually less than 3 mm. long. ....2. *P. Tolmiei*
        - EE. Leaf-blades narrowly linear-lanceolate,  $\pm$  recurved; calyx 1.4-2 mm. high, the lobes truncate or mucronate ....3. *P. cinicola*
      - DD. Inflorescence glandular-pubescent.
        - Rosette undeveloped; stems 2.5-7 dm. tall; calyx 1.7-3.3 mm. high, the lobes acute to acuminate; corolla pale purplish blue or roseate to white ....4. *P. Peckii*
        - Rosette well developed; stems less than 2.5 dm. tall; calyx 4-6 mm. high, the lobes caudate-tipped; corolla deep blue-purple. ....5. *P. washingtonensis*
  - CC. Corolla 10 mm. or more long, horizontal; anther-sacs longer than broad, mostly more than 0.5 mm. long.
    - F. Inflorescence not at all glandular.
      - G. Herbage not glaucous.
        - H. Anther-sacs dehiscent throughout and boat-shaped but not fully explanate nor pouch-shaped, the suture essentially glabrous; corolla usually less than 15 mm. long (except in *Rydbergii*) and up to 5 mm. wide pressed.
          - I. Corolla blue-purple or white, mostly 10-14 mm. long; calyx-lobes not conspicuously erose-margined. Nevada and westward.
            - J. Flowers blue-purple; cymules of the inflorescence dense.
              - K. Stems relatively slender; leaves always entire; corolla only slightly ampliate, up to 4 mm. wide pressed, obscurely bilabiate, the palate yellowish-bearded.
                - Mostly less than 5 dm. tall; calyx mostly 5 mm. or less high and glabrous, the lobes acuminate. East of the Cascades and southward ....6. *P. oreocharis*
                - Mostly more than 5 dm. tall; calyx mostly more than 5 mm. high and hirtellous, the lobes attenuate. West of the Cascades ....7. *P. hesperius*
              - KK. Stems relatively stout; leaves occasionally denticulate; corolla more obviously ampliate and bilabiate, up to 5 mm. wide pressed, the palate white-bearded. Washington. ....8. *P. Vaseyanus*
            - JJ. Flowers white; cymules not very dense. ....9. *P. pratensis*
          - II. Corolla indigo, mostly 15-18 mm. long, or if only 10-14 mm. the calyx-lobes conspicuously erose-margined. Utah and eastward. ....10. *P. Rydbergii*

- HH. Anther-sacs not quite dehiscent throughout, pouch-shaped, the suture denticulate; corolla mostly 15-20 mm. long and up to 7 mm. wide pressed; margin of calyx-lobes broadly scarious and erose.....11. *P. globosus*
- GG. Herbage glaucous; anther-sacs narrowly ovate, dehiscent throughout but not explanate. Cascade Range. ....12. *P. euglaucus*
- FF. Inflorescence glandular-pubescent.
- L. Corolla relatively small and slender; leaves thin, not glaucous. California. Stems relatively low (usually 2 dm. or less tall); inflorescence prominently glandular, often reduced to one cluster. High elevations, Sierra Nevada. ....13. *P. heterodoxus*
- Stems taller (2-5 dm.); inflorescence only moderately glandular, of 2-6 verticillasters. Mid-altitudes, northern California.....14. *P. shastensis*
- LL. Corolla larger or more amplate; leaves thicker. Oregon northward and eastward.
- M. Herbage glaucous; corolla not marked with guide lines within. Southern Oregon. ....15. *P. glaucinus*
- MM. Herbage not glaucous.
- Stems 3-9 dm. tall; leaves mostly acute, relatively thin; corolla 12-20 mm. long, pale yellow to blue-purple, without prominent guide lines. Eastern Washington and Oregon to Wyoming.....16. *P. attenuatus*
- Stems 1-2.5 dm. tall; leaves mostly rounded, relatively thick; corolla 10-13 mm. long, violet-blue, marked with guide lines within. Wallowa Mts., Oregon. ....17. *P. spatulatus*
- BB. Corolla pale yellow; inflorescence glabrous; margin of calyx-lobes much wider than herbaceous portion; bracts of the inflorescence scarious-margined and erose.
- Calyx 3-5 mm. high; corolla 8-10 mm. long; anther-sacs 0.4-0.5 long; leaves thin, drying green. ....18. *P. confertus*
- Calyx 6-7 mm. high; corolla 12-15 mm. long; anther-sacs 0.7-0.8 mm. long; leaves coriaceous, drying blackish .....19. *P. flavescens*
- AA. Calyx 2-3.5 mm. high; basal rosette undeveloped; corolla 12-17 mm. long, not glandular, blue. ....20. *P. Watsonii*

1. *PENSTEMON PROCERUS* Dougl. ex R. Grah.

Figs. 1 and 6

Stems slender, 1-4 (-7) dm. tall; rosette feebly developed; leaves deep green, thin, basal lanceolate to oblanceolate, 2-6 cm. long including the short slender petiole, cauline broadly oblong to narrowly lanceolate, amplexicaul; thyrsus strict, of 1-6 dense many-flowered verticillasters, the lower often well spaced, subsessile or on erect peduncles up to 4 cm. long; calyx-lobes elliptic to obovate, scarious-margined but quite entire, with caudate tip usually equaling or exceeding basal portion, glabrous or sometimes finely white-puberulent; corolla blue-purple, sparingly to fairly densely bearded on palate, the limb spreading; staminode included, with few short yellow hairs on the slightly dilated apex.  $n=8, 16$ .

## KEY TO SUBSPECIES

- Calyx-lobes 3-6 mm. long, the caudate tip mostly as long as or longer than the basal portion; corolla 6-10 mm. long; anther-sacs 0.4-0.7 mm. long.....1a. *P. p. ssp. typicus*
- Calyx-lobes 2-2.5 mm. long, the tip shorter than the broad basal portion which has a relatively broader more lacerate scarious margin; corolla 6-8 mm. long; anther-sacs 0.3-0.4 mm. long .....1b. *P. p. ssp. aberrans*

1a. *Penstemon procerus* ssp. *typicus* nom. nov.

- Penstemon procerus* Dougl. ex R. Grah., Edinb. N. Phil. Jour. 7:348, 1829. "Raised at the Botanic Garden, Edinburgh, from seeds gathered by Mr. Drummond." I have studied a photograph of a Drummond specimen at Kew labelled "Saskatchewan." His specimens probably came from the Saskatchewan River in Alberta. Graham took the name from Douglas in publishing this species, but Douglas had in mind the much taller plant (for which his name was appropriate) now referred to *P. hesperius* Peck, from the Columbia Gap.
- P. micranthus* Nutt., Jour. Acad. Phila. 7:45, 1834. "Hab. In the valleys of the Rocky Mountains, near the sources of the Columbia [N. B. Wyeth]." The type, collected by Wyeth on July 11, 1833, probably in southwestern Teton County, Wyoming (cf. W. A. Dayton, 1926), seen at the Academy of Natural Sciences of Philadelphia. As to the isotype in the British Museum, only one specimen out of four is this, the others being referable to *P. attenuatus* ssp. *pseudoprocerus*.
- Lepturis parviflora* Raf., New Fl. 2:73, 1836. "Oregon \* \* \* collected by Wyeth." Apparently based upon the same type as the preceding.
- P. confertus* var. *violaceus* Trautv., Bull. Acad. St. Petersb. 5:344, 1839. Based upon *P. procerus* Dougl. ex Grah.
- P. confertus* var. *caeruleo-purpureus* A. Gray, Proc. Amer. Acad. 6:72, 1862. Based upon *P. procerus* Dougl. ex Grah.
- P. confertus* var. *procerus* Cov., Contr. U. S. Nat. Herb. 4:169, 1893.
- P. procerus* var. *micranthus* (as *micranthus*) Jones, Bull. Univ. Mont. Biol. Ser. 15:45, 1910.
- P. procerus* ssp. *pulvereus* Penn., Contr. U. S. Nat. Herb. 20:366, 1920. "Type in the herbarium of the New York Botanical Garden, collected on moist meadow knolls, north of Swan Lake, Yellowstone National Park, Wyoming, in flower, July 7, 1915, by F. W. Pennell (no. 6036)." Type seen. From Alberta southward to western Wyoming plants occur with the sepals  $\pm$  densely puberulent. The type collection of *pulvereus* represents the extreme form of this development. In most colonies, apparently, the puberulent forms are mixed with glabrous plants, and in no considerable area is the puberulent form the only one found. This minor variation, therefore, does not seem to represent a natural unit, but is parallel to the same variation which reappears in similar spasmodic fashion in *P. oreocharis*.

Common in a variety of habitats, but usually frequenting meadow borders or open timbered slopes from southern Alaska to southern Colorado and northern Utah; extending from 650 m. elevation in the Yukon and Idaho up to 3650 m. in Colorado.

## Representative collections by counties:

ALASKA. Aspen Grove, *Went* 23 (C).

YUKON TERRITORY. Lake Kluana to Don Jek River, *Müller*; Lake Desert D'Asch; 25 mi. W. of Takhini, *Michel* 45; White Horse.

BRITISH COLUMBIA. Lake Atlin, *Eastwood* 662; Telegraph Creek, *Walker* 1193. Cariboo: Peace River Block, *Graham* 136; Germansen Landing, *McCabe* 7645, 7729; 30 mi. N. of Ft. St. James, *McCabe* 7551; 83-Mile House, *McCabe* 1370; Dog Creek. Kootenay: Lake Wapta, Yoho Park, *Rose* 37490. Yale: 13 mi. S. of Savona, *Hitchcock* & *Martin* 7400.

ALBERTA. Westlock, *McCalla* E3718; Beaverlodge, *Groh* 851; Formost, *McCalla* 3682.

MONTANA. Missoula: Fish Creek, *Hitchcock* 1694. Ravalli: Hamilton, *Blankinship* 578a. Fergus: Big Snowy Mts., *Berry*. Big Horn: West Rosebud River, *Hawkins*.

WYOMING. Big Horn: South Paintrock Creek, *Williams* 3153. Yellowstone Park: Wraith Falls, *A. & E. Nelson* 5707. Fremont: Union Pass, *Nelson* 833. Sublette: Merna, *E. B. & L. B. Payson* 2793.

COLORADO. Jackson: Camp, Keck 896. Clear Creek: Bard Creek Valley, near Empire, Patterson 255 (these two collections are toward *Rydbergii*). Summit: Argentine Pass, Jones 404. Saguache: Saguache Park, Rollins 1331. Mineral: Hankas Mill, Murdoch 4671 (sepals toward *Rydbergii*).

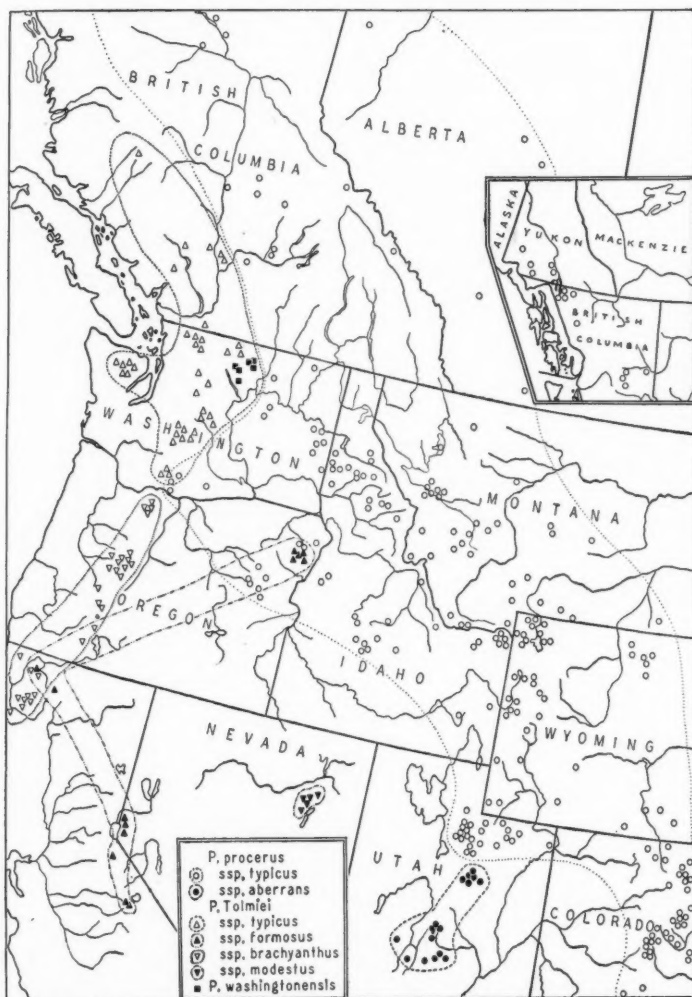


Fig. 6. Distribution of *Penstemon procerus*, *P. Tolmiei*, and *P. washingtonensis*.

UTAH. Duchesne: Moon Lake, *Graham* 9315. Summit: Snyderville, *Keck* 755. Salt Lake: Gogorza, *Pennell* 5964. Wasatch: Strawberry Reservoir, *Keck* 765.

IDAHO. Shoshone: 4 mi. up Merry Creek from Clarkia, *Christ* 8472. Clearwater: Headquarters, *Davis* 3583. Custer: Squaw Creek, near Clayton, *Macbride & Payson* 3375. Bonneville: Caribou Mt., *Payson & Armstrong* 3592.

WASHINGTON. Ferry: Orient, *Otis* 544. Grant: Grand Coulee, near Coulee City, *Thompson* 9135. Klickitat: Falcon Valley, *Suksdorf* 189.

OREGON. Wallowa: Wallowa Lake, *Eastwood & Howell* 3277. Malheur: Ironside, *Henderson* 9145.

### 1b. *Penstemon procerus* ssp. *aberrans* (Jones) comb. nov.

*Penstemon confertus* var. *aberrans* Jones, Proc. Calif. Acad. Sci. II. 5:715. 1895. "[M. E. Jones] no. 5601i. July 6, 1894, Soldier Summit, Utah, 7,300' alt., in gravel." Type seen in U. S. National Herbarium.

*P. procerus* (var.) *aberrans* A. Nels., Bot. Gaz. 54:146, 1912.

Mountain parks and meadow borders through the ranges of central Utah at elevations from 2200-3350 meters. Seldom found in extensive stands.

#### Representative collections:

UTAH. Utah: Soldier Summit, *Keck* 787. Emery: Summit of Huntington Canyon, *Keck* 706. San Pete: Gooseberry Meadow, E. of Fairview, *Keck* 698. Sevier: Fish Lake, *Jones* 5740. Garfield: Aquarius Plateau, *Cottam* 9105. Beaver: 5 mi. W. of Puffer Lake, *Keck* 643.

## 2. *PENSTEMON* *TOLMIEI* Hook.

Figs. 1 and 6

Stems slender, 0.6-3 dm. tall; rosette well developed; leaves deep green, rather firm, basal lanceolate to elliptic, 1.5-5 cm. long including the short slender petiole, cauline lance-oblong, amplexicaul, often widely spaced; thyrsus of  $1.4 \pm$  congested dense many-flowered verticillasters; calyx 2-5 mm. high, the lobes lanceolate to broadly ovate; corolla deep blue-purple (sometimes pale yellow in ssp. *typicus*), the limb spreading; anther-sacs ca. 0.5 mm. long; staminode included.  $n=8$ .

#### KEY TO SUBSPECIES

Calyx 3-5 mm. high, the lobes usually caudate-tipped, sometimes merely sharply acute but then very scariosus and lacerate and  $\pm$  elongated; stems 5-15 cm. tall; inflorescence usually reduced to a capitulum; corolla 9-11 mm. long, somewhat amplate, the lower lip larger than the upper, the palate densely bearded; staminode well bearded. Washington northward.....2a. *P. T.* ssp. *typicus*

Calyx mostly less than 3 mm. high; corolla obscurely bilabiate.

#### Rosette prominent.

Stems 4-15 cm. tall, with leaves reduced in size; calyx 1.7-2.7 mm. high, the lobes obtuse to cuspidate-tipped and with less prominent essentially entire margin; inflorescence of 1-2 dense verticillasters; corolla 7.5-11 mm. long, tubular, the palate lightly bearded to glabrate; staminode glabrous to lightly bearded or with fairly prominent apical tuft. Wallowa Mts. to Mt. Eddy and the central Sierra Nevada.....2b. *P. T.* ssp. *formosus*

Stems 15-30 cm. tall, prominently leafy, calyx 2-3 mm. high, the lobes usually cuspidate-tipped and with prominently scariosus erosulate margin; inflorescence an interrupted spike of 3-5 verticillasters, sometimes reduced to one; corolla 7-11 mm. long, tubular or moderately amplate, the palate lightly bearded; staminode  $\pm$  well bearded. Mt. Hood to Trinity Co., Calif. ....

.....2c. *P. T.* ssp. *brachyanthus*



Rosette more obscure; stems 8-20 cm. tall; calyx 1.5-2.2 mm. high, the lobes obtuse or abruptly cuspidate and with rather prominently scarious erose margin; inflorescence an interrupted spike of 3-5 verticillasters, or reduced to a capitulum; corolla 7-9 mm. long, tubular, the palate feebly bearded; staminate glabrous. Elko Co., Nevada. ....2d. *P. T. ssp. modestus*

2a. *Penstemon Tolmiei* ssp. *typicus* nom. nov.

*Penstemon Tolmiei* Hook., Fl. Bor. Amer. 2:98, 1838, "Hab. Mt. Rainier, N. of the Columbia. Mr. Tolmie." Phototypes (C, CI, SU) and a fragment from the only sheet in Hooker's Herbarium, Kew, have been examined. The type consists of three fruiting pieces.

Alpine and subalpine slopes and meadows from western British Columbia south to Mt. Adams, Washington, at elevations from 1300-2200 meters.

Representative collections:

BRITISH COLUMBIA. Cariboo: Mt. McLean, Lilloet, *Anderson 6311*; Green Mt., near Haylmore, *J. W. & E. M. Thompson 679*. Yale: Lake Bootahie, *J. W. & E. M. Thompson 96, 181*; W. of Skagit River, *Macoun 76798*. Vancouver: peak 15 mi. S.W. of Kleena Kleene, *McCabe 579*.

WASHINGTON. Whatcom: Mt. Baker, *Mason 3851*. Snohomish: Mt. Dickerman, *Thompson 8842*. Clallam: Mt. Angeles, *Thompson 7462*. Jefferson: Marmot Pass, *Thompson 9946*. Pierce: Mt. Rainier, *Allen 298*. Yakima: Mt. Aix; Mt. Adams, Wodan's Vale, *Suksdorf 3860*. Okanogan: Burch Mt., *Thompson 10843*. Chelan: Three Brothers, *Thompson 10723*; Mt. Stuart. Kittitas: Red Mt.; Bald Mt.

In the Cascades of Washington, plants often bear creamy white flowers that dry yellow. Such plants show no ecologic distinctions from the commoner blue-flowered ones, but grow intermixed with them.

2b. *Penstemon Tolmiei* ssp. *formosus* (A. Nels.) comb. nov.

*Penstemon pulchellus* Greene, Pittonia 3:310, 1898. Not *P. pulchellus* Lindl. 1828. "On alpine summits of the Blue Mountains, Oregon, W. C. Cusick, n. 1720." The type, collected in 1897, seen in the Greene Herbarium, Notre Dame; also isotypes, C, Ph, Pul, SU.

*P. formosus* A. Nels., Proc. Biol. Soc. Wash. 17:100, 1904. Not *P. formosus* Trautv. 1839, a nomen nudum. New name for *P. pulchellus* Greene.

*P. chionophilus* Greene, Leaflets 1:161, 1906. "Snow Valley, Ormsby Co., Nevada, C. F. Baker, 8 July, 1902, n. 1278 as in U. S. Herb." Type studied; also isotypes C, CAS, ND, Po.

*P. cacuminis* Penn., Notulae Naturae 71:2, 1941. New name for *P. pulchellus* Greene, but Nelson's name is valid since it is not a later homonym of a legitimately published name. In a mere list of *Penstemon* species Trautvetter lists "Pent. (Chelone) formosus Thoms." Pennell interprets this as a transfer of the previously published *Chelone formosa* Wendl., but by the Rules, I believe, Trautvetter's name is a nomen nudum only.

On alpine peaks of the Wallowa Mts., Oregon, of the Marble Mts. and Mt. Eddy, and of the central Sierra Nevada, California, and of the Mt. Rose region, Nevada, at elevations from 2150-3540 meters.

Representative collections:

OREGON. Wallowa: Sentinel Peak, *Reid 770*; Petes Point; saddle S. of Ice Lake; Eagle Cap Peak, *Sharsmith 3939*. Baker: near Cornucopia, *Thompson 13398*.

CALIFORNIA. Siskiyou: Marble Mt., *Chandler 1639*; Mt. Eddy, *Eastwood*; Heller

13427; Dudley. Alpine: Frog Lake, S. of Carson Pass, Rose 44164. Mono: Dana Plateau, N. of Mt. Dana, Keck 4965; Howell 20293. Tuolumne: Mt. Dana, Hall & Babcock 3617; Mono Pass, Howell 20619.

NEVADA. Washoe: Slide Mt., Heller 10958; Mt. Rose, Heller 9905; Kennedy 1152.

As shown in the distribution map, figure 6, this subspecies is localized in three well separated areas. The material from these three areas is morphologically very similar, although it may have been isolated for a long period of time. The collections from Mount Dana are of remarkably reduced plants, with almost grass-like linear-oblongate folded leaves, but recent collections from Carson Pass and Mono Pass link these with ssp. *formosus*.

In addition to the characters brought out in the key, the densely caespitose habit of this subspecies, and its small more coriaceous leaves with ovate blades only 1 cm. long, distinguish it from ssp. *brachyanthus*, with which it is most apt to be confused.

### 2c. *Penstemon Tolmiei* ssp. *brachyanthus* (Penn.) comb. nov.

*Penstemon brachyanthus* Penn., Notulae Naturae 71:3, 1941. "Type, ledges of andesitic rock, above timberline, alt. 6000-6500 ft., west of Cloud Cap Inn, Mount Hood, Hood River County, Oregon, collected in flower July 28, 1931, by Francis W. Pennell, no. 15710; in Herb. Academy of Natural Sciences of Philadelphia." Isotype studied, Cl.

High montane; in rocky or grassy places through the Cascade Range of Oregon, southward to the Salmon and Trinity Alps of northwestern California, at elevations from 1200-2300 meters.

#### Representatives collections:

OREGON. Clackamas: Mt. Hood, S. side above timberline, J. T. Howell 7275; Paradise Park; Government Camp. Deschutes: 4 mi. N. of North Sister Mt., Hitchcock & Martin 4867, 4868; Sparks Lake, Howell 7151. Lane: 5.5 mi. W. of McKenzie Pass, M. & R. P. Ownbey 1795; summit Horse Pasture Mt., 10 mi. S. of McKenzie Bridge, Peck 5902. Jackson: Lake-of-the-Woods, Thompson 13099.

CALIFORNIA. Siskiyou: Upper Campbell Lake, Shackleford Creek, Butler 1739; Black Mt., Marble Mts., Howell 15184; E. spur of Preston Peak, Kildale 8604; head of Salmon River, Hall 8672; Caribou Basin, Howell 13390. Humboldt: head of Brett Hole, Trinity Summit, Tracy 10480. Trinity: head of Grizzly Creek; Upper Canyon Creek Lake; head of White's Creek, Devil's Canyon Mts., Tracy 14539.

### 2d. *Penstemon Tolmiei* ssp. *modestus* (Greene) comb. nov.

*Penstemon modestus* Greene, Leaflets 1:165, 1906. "Ruby Mountains back of Deeth, Nevada, 20 July, 1896, collected only by myself; the type in my herbarium." Type seen, ND.

*P. confertus* var. *modestus* Jeps., Man. Fl. Pl. Calif. 914, 1925.

Dry gravelly alpine slopes in the East Humboldt and Ruby ranges of Elko County, Nevada, at elevations from 2750-3230 meters.

#### Representative collections:

NEVADA. Elko: East Humboldt Mts., Jones; Ruby Mts. near Blaine, Heller 11104; above Liberty Pass, Munz 16223; Three Lakes, Borell; Lamoille Canyon, Mills & Beach 1387, 1493.

The four subspecies of *Tolmiei* here recognized appear obviously to form a close alliance, with a genetic affinity scarcely open to question. Under the protection of at least a partial geographic isolation, the different branches of the species have developed a gradual distinctness, but it is improbable that genetic barriers have developed between them as yet. These subspecies appear to be more closely related to each other than to any other unit. The largest gap between them is probably between *typicus* and the others, but this distinction is found to be mainly one of calyx-size.

Instead of these subspecies being maintained as species, as has been the trend, it appears to be more probable that experimental evidence might call for the inclusion of all these in *P. procerus*. Even though *Tolmiei typicus* occurs close to *procerus* in British Columbia, small but constant differences appear to be available to distinguish them. It becomes more difficult to keep ssp. *modestus* separated from alpine forms of *procerus* from central Idaho. The latter intergrade completely with the *procerus* of lower elevations nearby, and are probable derivatives of that caudate-sepaled material, whereas *modestus* is thought to have connections with the truncate-sepaled *Tolmiei* subspecies to the westward.

### 3. PENSTEMON CINICOLA Keck

Figs. 1 and 7

*Penstemon cinicola* Keck, Carnegie Inst. Wash. Publ. 520:294, 1940. "Type, from among tussocks of grass and sedge on bare volcanic sand, in openings of *Pinus contorta* forest just north of Lapine, Deschutes County, Oregon, at 1285 m. (4225 ft.) elevation, June 23, 1935, Keck & Clausen 3690 (Dudley Herbarium \* \* \*);" isotypes CI, Ph.

*P. truncatus* Penn., Notulae Naturae 71:5, 1941. "Type, along stream in pine forest, alt. 4700-5100 ft., Davis Lake, Klamath County, Oregon, collected in flower July 10, 1931, by Francis W. Pennell, no. 15550; in Herb. Academy of Natural Sciences of Philadelphia." Isotype studied, CI. The same form as the type of *cinicola*.

*P. truncatus* forma *puberula* Penn., loc. cit. "Type, gravelly pine-flats, south of Lonroth, Klamath County, Oregon, collected in flower July 11, 1931, by F. W. Pennell, no. 15562, in Herb. Academy of Natural Sciences of Philadelphia." This form, with herbage strongly puberulent throughout, previously reported only from the type collection, has also been taken at Gilchrist, Klamath County, Keck 5183, and northeast of Crater Lake National Park, McCalla 4912.

Stems very slender and numerous from a suffrutescent closely branched root-crown, forming clumps 15-35 cm. tall; no rosette developed; herbage entirely glabrous to minutely puberulent throughout; leaves bright green to gray-green, rather firm, not glaucous, entire and obscurely dimorphic, narrowly linear-lanceolate, folded along the midrib and  $\pm$  recurved, 2.5-5.5 cm. long, 2-4 mm. wide; thyrsus strict, virgate, of 2-7 interrupted verticillasters, the lower well spaced and on almost filiform but strictly erect peduncles up to 3 cm. long, many-flowered; calyx 1.4-2 mm. high, the lobes obovate-oblong, truncate or mucronate, with broad scarious subentire margin; corolla purple with deep blue lobes, 7-9 mm. long, the limb spreading, the palate obscurely ridged and but moderately yellow-bearded; anther-sacs 0.35-0.5 mm. long; staminoide like *procerus*.  $n = 8, 16$ .

Largely confined to dry volcanic sands from western Crook County, Oregon,

southward east of the Cascades to Lassen County, California, at elevations from 1000-2300 meters.

Representative collections:

OREGON. Crook: near Prineville, *Leiberg* 355. Deschutes: 9 mi. N. of Bend, *Howell* 6935; Elk Lake, *Peck* 14342; Paulina Lake, *Howell* 7113; Glass Butte, *Peck* 13835. Lake: Button Springs, *Leiberg* 355; Drake Peak, *Applegate* 7830; Crane Mt., *Thompson* 13201. Klamath: Beaver Marsh, *Keck* 5182; Sand Creek; Ft. Klamath; Klamath Agency. Douglas: W. slope of Mt. Thielson, 8000 ft., *Applegate* 4827 (SU), rather intermediate to *Tolmiei brachyanthus*.

CALIFORNIA. Modoc: Egg Lake, *Baker & Nutting*. Siskiyou: Medicine Lake, *Eastwood* 10963, 10984. Lassen: Pine Creek, *M. S. Baker* 152.

The occasional presence of puberulent herbage in *cinicola* suggests a connection with its neighbor, *P. cinereus*, but that is much more remote than the one suggested by the obvious similarity between its corolla and calyx with those of *Tolmiei brachyanthus*, which is probably its closest relative. Its peculiar habit reappears to some extent in the following species, which is also a very near relative.

4. *PENSTEMON PECKII* Penn.

Fig. 7

*Penstemon Peckii* Penn., *Notulae Naturae* 71:12, 1941. "Type, sandy loam, pine woods, alt. 3100-3400 ft., about 9 miles northwest of Sisters, Deschutes County, Oregon, collected in flower July 8, 1931, by Francis W. Pennell, no. 15528; in Herb. Academy of Natural Sciences of Philadelphia." Isotype studied, CI.

Stems very slender, 2.5-5(-7) dm. tall; rosette undeveloped; leaves deep green, thin, basal narrowly lanceolate, tapering to apex and slender petiole, 2-5 cm. long, cauline linear-lanceolate, not amplexicaul; thyrsus finely glandular-pubescent, strict, virgate, of 2-5(-9) moderately congested several-flowered verticillasters, the lowest on erect peduncles up to 4 cm. long; calyx 1.7-3.3 mm. high, the lobes broadly lanceolate to ovate, acute to acuminate, with rather prominent scarious subentire margin; corolla pale purplish blue to white, 8-10 mm. long, the limb expanded, the low-ridged palate moderately pilose; anthers 0.4-0.5 mm. long; staminode like *procerus*.

Eastern slope of the Cascade Range from Mount Hood to Three Sisters, Oregon, at elevations from 900-1500 meters.

Representative collections:

OREGON. Hood River: Cloud Cap, Mt. Hood, 1929, *Van Dyke* (CAS). Jefferson: Camp Sherman on Metolius River, *Gale* 314, 315. Deschutes: Metolius River, 8 mi. S.E. of Suttle Lake, *Hitchcock & Martin* 4875; Three Sisters, *Van Dyke*; Squaw Creek, *Cusick* 2658.

This rather uncommon form, well marked by its glandular inflorescence and very pale flowers, is very closely related to *Tolmiei brachyanthus* and perhaps somewhat less closely to *cinicola*. Intergrades between these units have not been found.

5. *Penstemon washingtonensis* sp. nov.

Fig. 6

Stems slender, finely puberulent in lines to glabrate, several from a matted suffrutescent caudex, 12-24 cm. tall; rosette well developed; leaves deep green,

slightly coriaceous, basal lanceolate to oblanceolate, 2.5-5.5 cm. long including the slender petiole, 5-15 mm. wide, cauline lance-oblong, obtuse or acute; thyrsus of 1-3 rather crowded many-flowered verticillasters, glandular-pubescent; calyx 4-6 mm. high, the lobes lance-oblong with caudate tips and prominently scarious  $\pm$  erose margin; corolla deep blue-purple or occasionally ochroleucus, 9-11 mm. long, 2-3 mm. wide, slightly ampliate, the lower lip scarcely exceeding upper, limb expanded, the low-ridged palate densely bearded; anther-sacs ovate to orbicular, 0.5-0.6 mm. long; staminode included, bearded feebly to heavily with short stiff golden hairs at apex or for  $\frac{1}{3}$  its length. (Panicula glanduloso-pubescente; aliter *P. Tolmiei* typico simillima.)

Type: junction of Nelson Butte and Copper Mountain roads, north of Lake Chelan, Chelan County, Washington, in moist open flat, with *Pinus contorta* var. *Murrayana*, 6000 ft. elevation, July 18, 1936, *Marvin Kelly* 21 (California Academy of Sciences, no. 246323); isotypes CI, Pul.

WASHINGTON. Okanogan: on gravelly S. slopes W. of Salmon Meadows, 5500 ft., *Fiker* 1035 (CI), 1036 (CI, Pul), 1054 (CI): Rock Mountain, 6500 ft., *Fiker* 360 (Pul); head of Lone Frank Creek, *Fiker* 2270 (Pul); 1 mi. S.E. of Midnight Mountain Lookout, W. of Twisp, *Blomdahl* (Pul). Chelan: South Navarre Peak, *Kelly* 011 (CI, Pul).

The presence of sepals and habit of *Tolmiei*, and the occurrence of an occasional plant with yellowish flowers, point to a closer affinity between *washingtonensis* and *Tolmiei typicus* than between it and *procerus*, which is also found nearby. The glands of the inflorescence may not prove to be of specific significance in this instance, although elsewhere in the section this character is more clearly associated with others to mark species. But the ultimate disposition of *washingtonensis* may best be determined after the barriers between *procerus* and *Tolmiei* have been subjected to test.

## 6. PENSTEMON OREOCHARIS Greene

Figs. 1 and 7

*Penstemon oreocharis* Greene, Leaflets 1:163, Jan. 23, 1906. "Pine Ridge, Fresno Co., Calif., July, 1900, Hall [&] Chandler, n. 301 as in U. S. Herb." Type studied, also isotypes Ph. SU. The isotype sheets are on printed "Pine Ridge" labels and bear the date 6/15-25/00, which is doubtless the correct one as the label on the type at US is printed "Tehipite Valley" which has been scratched out with "Pine Ridge" written in by Hall. The SU sheet bears the additional word "Shaver" in Hall's hand. This probably indicates that the collection actually came from Shaver Lake, 5 miles northerly from Pine Ridge at 5270 feet elevation, whereas Pine Ridge is 4940 feet. I don't know of the existence of a field notebook for this particular trip of Hall's, where otherwise the actual type locality of *oreocharis* could be determined.

*P. interruptus* Greene, loc. cit. "Soda Springs on Mt. Conness, Calif., July 1890, W. G. Harford. Type in my herbarium." Type studied, ND. This is doubtless the Soda Springs in Tuolumne Meadows. The same form as the type of *P. oreocharis*.

*P. washoensis* Greene, loc. cit. "About Washoe Lake, Nevada, alt. 5,000 ft., 13 June, 1902, C. F. Baker, n. 1079, as in U. S. Herb." Type studied; also isotypes C, Po. The same form.

*P. lassenianus* Greene, *ibid.* 164. "At 6,000 feet on Lassen's Peak, California, 8 July, 1897, M. E. Jones. Type in U. S. Herb." Type studied; also isotype Po. In this

form the calyx-lobes bear an acuminate tip almost as long as the body as compared with the preceding, more southern forms in which the short-acuminate to abruptly acute tip is considerably shorter than the body. The extreme caudate tip is found in the following form, *productus*. All intergradations are found in this character, which is not geographically distinct. Material with more or less tailed calyx-lobes occurs from Washington to Mt. Lassen, and occasionally as far south as Tuolumne County, but plants with short, abruptly tipped lobes are common from as far north as Deschutes Co., Oregon, to the southern limit of the species.

- P. productus* Greene, *ibid.* 166. "Stein's Mountain, Oregon, 1896, J. B. Leiberger, n. 2, 384, as in U. S. Herb." Type, collected in the pass from Anderson Valley at 1520 m. elevation, June 24, studied; also isotypes C, Po. Cf. *P. lassenianus*.
- P. recurvatus* Heller, Muhl. 2:247, Dec. 31, 1906. "The type is [Heller] no. 8360, collected May 31, 1906, in the foothills west of Bishop, Inyo County, California, a short distance above the house in 'McGee's meadows,' in a moist grassy place." This location is actually in Mono County. Isotypes studied, C, SU. Slightly more glaucescent, with  $\pm$  recurving upper cauline leaves, but this indistinct Great Basin form is thoroughly linked with the common Sierran material.
- P. attenuatus* (var.) *varians* A. Nels., Bot. Gaz. 54:146, 1912. This improperly published variety is described in most general terms and contains several discordant elements. Under the mistaken impression that such characters "as viscosity, pubescence, and [flower-]color may change with every change of environment," the author proceeds to consider *attenuatus*, *confertus*, and *procerus*. He would "let the large-flowered forms" (no measurements given, but 20 mm. or more is the implied length) "without reference to color or the presence or absence of pubescence or glandulosity" constitute the variety. As "excellent examples" he cites "Macbride's no. 974, Twilight Gulch, Owyhee County [Idaho], June 23, 1911, and his no. 1693, Pinehurst, Boise County, August 17, 1911." Macbride 974, which from its position may be accepted as the type, is referable to *P. oreocharis* (isotypes seen, C, Po, Pul, SU), while Macbride 1693 (C, Po, Pul, SU) I refer to *P. attenuatus* ssp. *militaris*.
- P. tinctus* Penn., Notulae Naturae 71:6, 1941. "Type, lower end of Donner Lake, Nevada Co., California, collected in flower July 10, 1903, by A. A. Heller, no. 6897; in Herb. Academy of Natural Sciences of Philadelphia." Isotypes studied, C, Po, SU. Pennell would keep *tinctus* distinct from *oreocharis* on the basis of its occurrence at higher elevations, its broader corolla-throat, its included stamens, and its more scarious and more erose calyx-lobes. I find these characters variable and of no significance in marking a natural unit here.

Stems 2.5(-7) dm. tall; rosette well developed; herbage bright green and essentially glabrous throughout; leaves thin, basal linear-oblancoate to elliptic, 3-10 cm. long including the slender petiole which frequently equals the blade, cauline becoming oblong or lance-oblong, the upper, at least, amplexicaul; thyrsus of 2-3 (1-6)  $\pm$  distinct many-flowered verticillasters, the lower with short strict peduncles; calyx 3.5(-7.5) mm. high, the lobes oblong, abruptly narrowed to the acuminate tip, with narrow to broad scarious margin, usually quite entire, sometimes erose; corolla 10-13(-15) mm. long, the limb expanded, lips equal, the scarcely ridged palate prominently pale-yellow bearded; anther-sacs ovate to orbicular, 0.55-0.85 mm. long; staminode reaching orifice, densely bearded with long golden hairs for outer half its length or only apically, rarely glabrous, the recurved tip spatulate-dilated.  $n=8$ .

Washington (Kittitas Co.), through Oregon to western Idaho, northern Nevada, and the Sierra Nevada of California, southward to Inyo and Fresno counties on both flanks of the range, at elevations from 750-3100 meters; in moist or rather dry meadows, sometimes even standing in shallow water.

## Representative collections:

WASHINGTON. Kittitas: Virden, *Thompson 11593*, Yakima: North Yakima, *Leck-enby*, Asotin: Old Mill, *Onstot (Pul)*.

IDAHO. Valley: Cascade, *Christ 11150*, Adams: Pyramid Peak, *Christ 8649*; New Meadows. Owyhee: Riddle, *Christ 11113*.

OREGON. Wallowa: Wallowa, *Eastwood & Howell 3427*, Union: Kamela, *Heller 10135*, Harney: Fish Lake, *Thompson 12126*, Lake: Button Springs, *Leiberg 357*; Chandler State Park, *Keck & Clausen 3701*; 10 mi. S. of Lakeview, *Keck & Clausen 3706*, Klamath: 5 mi. E. of Crescent Lake, *Howell 6924*; Crater Lake National Park, *Applegate 9134, 9864, 10680*, Jackson: Huckleberry Mt., *Coville & Applegate 367*.

NEVADA. Elko: Merit Mt., *Nichols & Lund 468*; Owyhee: Tuscarora. Humboldt: Coosnae Creek, N. end Sonoma Range, *Train 368*; Hinky Summit, Santa Rosa Range.

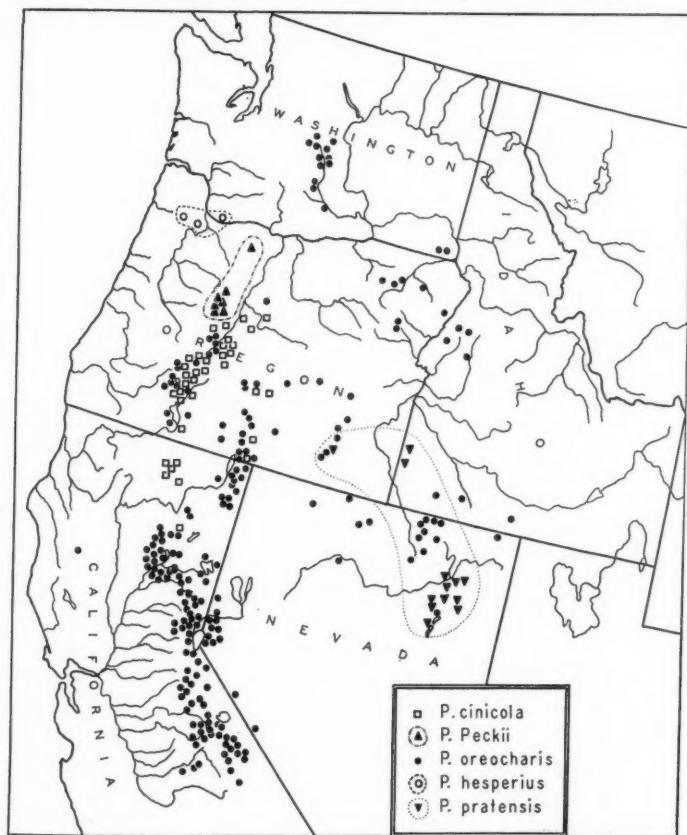


Fig. 7. Distribution of *Penstemon cinicola*, *P. Peckii*, *P. oreocharis*, *P. hesperius*, and *P. pratensis*.



*Train* 282. Washoe: betw. Washoe and Franktown, *Heller* 10595. Esmeralda: Chiato-vich Creek, White Mts., *Duran* in Univ. Calif. Set 582.

CALIFORNIA. Modoc: Plum Valley, *Howell* 12022. Lassen: Westwood, *Heller* 15182. Plumas: Red Clover Valley, *Heller & Kennedy* 8735; Meadow Valley, *Schreiber* 2521; Gray Eagle Valley, *Keck* 439. Tehama: Mineral, *Keck* 961. Glenn: Plaskett Meadows, *M. & R. P. Ownbey* 1709. Butte: Jonesville, *E. B. Copeland* in Univ. Calif. Set 689. Alpine: Bloods, *Wiggins* 8989. Mono: Slate Creek Valley, *Keck* 4922; Convict Lake, *Keck* 3894. Inyo: Big Pine Creek, 8000 ft., *Alexander & Kellogg* 2561. Fresno: Huntington Lake, *Grant* 1094.

This species intergrades little with the other members of the *Proceri*. At Diamond Lake, Douglas County, Oregon, it appears to have the calyx of *Tolmiei brachyanthus*, but hybridization between these units does not appear to be extensive. In Slate Creek Valley, Mono County, California, a small colony of *oreocharis* occurs surrounded by *heterodoxus typicus*, the usual representative of the *Proceri* there. Only a small percentage of the peripheral plants of the colony were hybrids. No other instances of interspecific hybridization involving *oreocharis* are known.

In eastern Oregon and as far south as Lassen Peak the variation with densely puberulent inflorescence occasionally appears—a counterpart to the *pulvereus* form of *procerus*. Such plants grow intermixed with entirely glabrous individuals, but it is of interest that this form may predominate in populations of the following species, *P. hesperius*, which is closely related to *oreocharis*.

The flower-color is moderately variable between the blue and purple shades, but in the central Sierra Nevada one occasionally finds pink-flowered mutants. These ordinarily grow with the plants of usual flower-color.

#### 7. PENSTEMON HESPERIUS Peck

Fig. 7

*Penstemon hesperius* Peck. *Torrey* 32:152, 1932. "Type *Peck* 16187, collected at Gaston, Washington County [Oregon], in a boggy meadow June 27, 1930, where it occurred plentifully." Isotypes seen, GH, Pul.

Stems from a slender suffrutescent scarcely branched caudex, 5-8(-12) dm. tall; rosette moderately developed; herbage bright green, glabrous throughout or becoming hirtellous toward inflorescence (often quite densely so); leaves thin, basal narrowly elliptic, short-petioled, 4-9 cm. long, cauline obtuse or acute, gradually reduced upwards, amplexicaul; thyrus strict, of 3-4 many-flowered  $\pm$  confluent verticillasters; calyx 4-7(-9) mm. high, the lobes variable, mostly ovate with caudate-attenuate appendage equaling or exceeding the body, or lanceolate throughout, the narrow scarious margin entire, or if conspicuous,  $\pm$  erose; corolla 12-14 mm. long, the limb expanded, lips equal, the scarcely ridged palate prominently yellow-bearded; anther-sacs broadly ovate, 0.7-0.8 mm. long; staminode reaching orifice, densely bearded with long golden hairs at and near the flattened-dilated straight apex.

I know this only from the type collection and the following:

WASHINGTON. On moist ground near the Grand Rapids (i.e., between Vancouver, Clark Co., and Stevenson, Skamania Co.), *David Douglas* (Herb. Benth., Kew, photo-

graphs C, CI, SU); duplicate sheet labelled, "in swampy and overflowed med. . . between Fort Vancouver and the Grand Rapids on the north side of the river" (Herb. Hook., Kew, photograph Po). This collection was that to which Douglas assigned the manuscript name, *P. procerus*. However, when that name was taken up by Graham, a new type was designated, belonging to a different species.

OREGON. Clackamas: low ground along railroad, Cook, June 22, 1921, J. C. Nelson 3889 (CI, Ph).

This species appears to be an offshoot of *oreocharis*, having many features in common with that species as it is found in eastern Oregon. The remarkable features of *hesperius* are the height, the boggy habitat, and the isolation. It is also similar to *Vaseyanus*, but the rosette is less developed, the leaves are somewhat less ample, and the features that mark it from *oreocharis* also apply here. Its staminode differs somewhat from either. Awaiting cytological help, these three species are maintained, but it is possible that *hesperius* and *Vaseyanus* are polyploid derivatives of *oreocharis* and merely subspecies of one species.

#### 8. PENSTEMON VASEYANUS Greene

Fig. 9

*Penstemon ellipticus* Greene, Leaflets 1:167, 1906. Not *P. ellipticus* Coult. et Fish., 1893. "Type in U. S. Herb. from some unrecorded station in the State of Washington, in 1889, by G. R. Vasey, n. 446." Type, doubtless collected in either Kittitas or Yakima counties, studied.

*P. Vaseyanus* Greene, Leaflets 1:200, 1906. New name for *P. ellipticus* Greene.

Stems 2-5 dm. tall; rosette well developed; herbage bright green and essentially glabrous throughout; leaves thin, entire, or occasionally one or two pairs obscurely denticulate, basal elliptic, tapering to the slender petiole half as long as the blade, 3-12 cm. long (including petiole), up to 2.6 cm. wide, cauline becoming broadly oblong or lance-oblong, the upper ones cordate-clasping; thyrsus of 1-5 many-flowered verticillasters, the lower well spaced on short appressed peduncles; calyx 4-7.5 mm. high, the lobes linear-oblong to lance-ovate tapering to the fleshy acuminate  $\pm$  uncinatate tip half as long to as long as the body, margin prominently scarious, only slightly erose; corolla blue-purple, 11-15 mm. long, gradually amplate, to 5 mm. wide pressed, rather obviously bilabiate, the limb expanded or the upper lip erect, the ridged palate prominently bearded with long white hairs; anther-sacs broadly ovate, 0.7-0.8 mm. long; staminode reaching orifice, densely bearded with long golden hairs for outer half its length, the declinate tip not dilated.

South-central Washington, at elevations from 500-1600 meters; in meadowy places in open sagebrush or on forested slopes.

WASHINGTON. Kittitas: Colockum Pass, H. W. Smith 1218 (Pul, UW); N. of Ellensburg, Thompson 8360 (CI). Yakima: Goose Prairie, E. Nelson 1641 (Pul); Yakima region, 1882, T. S. Brandegee (C). Klickitat: Simcoe Mts., 15 mi. N. of Goldendale, 8/3/17, Peck (Pul).

As mentioned under *P. hesperius*, *Vaseyanus* has the appearance of being a polyploid derivative of *oreocharis*, but its cytological situation has not been examined. It also bears a resemblance to *euglaucus*, although it is not glaucous. If it proves to be hexaploid, *euglaucus* could conceivably be referred to it as a

subspecies. The occasional obscure denticulation of the leaves suggests some influence probably of *subseratus*, of the *Humiles*, but there obviously has been extremely limited gene exchange here. In summation, *Vaseyanus* cannot be adequately understood before experimental evidence becomes available.

#### 9. *PENSTEMON PRATENSIS* Greene

Figs. 1 and 7

*Penstemon pratensis* Greene, Leaflets 1:165, 1906. "Moist meadows of the Humboldt River about Deeth, Nevada, 14 July, 1896, collected only by the writer." Type studied, ND.

Stems slender to rather stout, 2.5-5 dm. tall; rosette moderately developed; herbage light green, glabrous throughout; leaves thin, basal linear-ob lanceolate to elliptic, on short or elongated petioles, 3-8 cm. long, lower cauline up to 9 cm. long and 18 mm. wide, upper cauline amplexicaul; thyrsus strict, virgate, of 2-5 several-flowered verticillasters, not very dense; calyx 4-7 mm. high, the lobes lanceolate to oblong with short acuminate tip, the rather narrow scarious margin entire or moderately erose above; corolla white (the buds tipped with yellow), 11-14 mm. long, nearly tubular to obviously ampliate, the 2-ridged palate moderately to rather densely bearded with long yellowish hairs; anthers ovate, 0.65-0.75 mm. long; staminode reaching orifice, densely bearded with long golden hairs for 1 mm. back from somewhat dilated tip.  $n=16$ .

Steins Mountain, Oregon, southeasterly to Elko County, Nevada, at elevations from 1500-2750 meters; in moist meadows or stream borders in sagebrush or aspen.

##### Representative collections:

OREGON. Harney: Steins Mt., east base, dry lower canyons at 5000 ft. in sagebrush belt, June 19, *Train* (Oberlin).

IDAHO. Owyhee: Cow Creek, *Davis 2146* (CI); N. slope of South Mountain, *Platt 78*.

NEVADA. Elko: Wells, *Jones 25553*; Welcome; Deeth, *Heller 9123*; Harrison Pass Ranger Station, Ruby Mts., *Borell*; Twin Bridges; Thomas Canyon, *Rollins & Chambers 2565*; Lamoille Canyon, *Best 64*.

This tetraploid species is morphologically most closely related to the diploid, *P. oreocharis*. As shown on the map, figure 7, the two meet, but *pratensis* largely replaces *oreocharis* within its range. The white flowers of *pratensis* do not suggest an autopolyploid origin for it from *oreocharis*, and possibly there has been a connection between it and the pale yellow-flowered *confertus*, also a tetraploid, but this connection is not at all obvious.

#### 10. *PENSTEMON RYDBERGII* A. Nels.

Figs. 2 and 8

Stems slender to rather stout, 1.5-4(-6) dm. tall; rosette well developed; leaves deep green, thin or rather firm, basal elliptic to narrowly oblanceolate, obtuse or acute, tapering to a usually short petiole, 4-10 cm. long, middle cauline often more prominent, up to 15 cm. long and 3 cm. wide, at least the

upper amplexicaul; thyrsus of 2-7 strict, moderately congested many-flowered verticillasters, the lower more spaced on appressed peduncles; calyx 4-7 mm. high, the lobes lanceolate to ovate, abruptly terminated by a narrow tip shorter than the body; corolla 10-18 mm. long, gradually ampliate, to 5 mm. wide pressed, the ample limb flaring, the 2-ridged palate lightly to rather densely

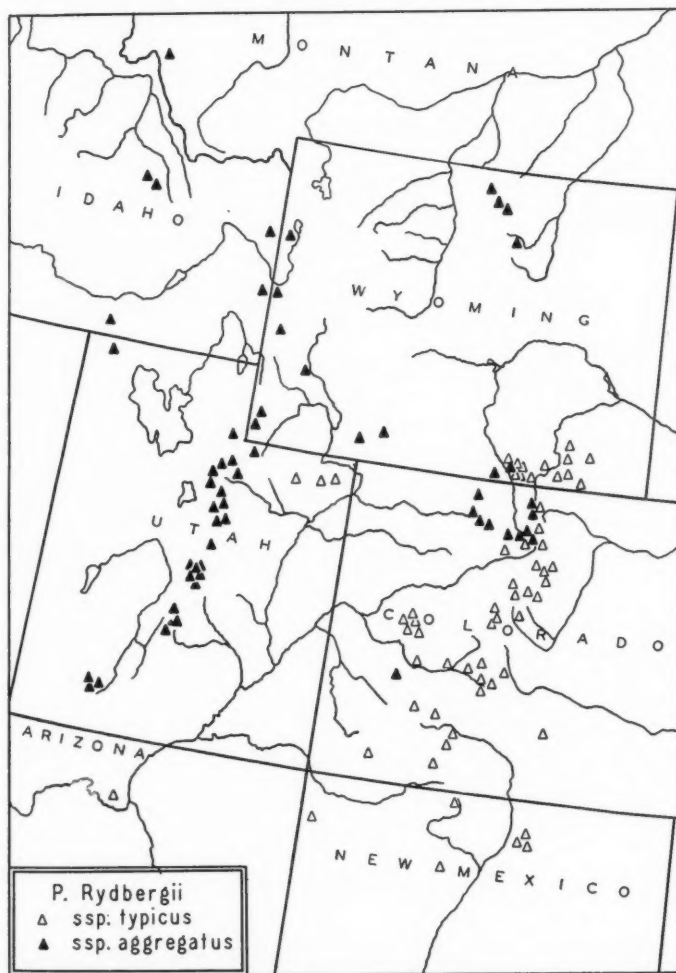


Fig. 8. Distribution of *Penstemon Rydbergii*.

bearded with yellowish hairs; anther-sacs ovate, 0.5-0.85 mm. long; staminode reaching orifice, densely bearded with long golden hairs at the somewhat dilated tip.  $n = 16$ .

## KEY TO SUBSPECIES

- Calyx-lobes with relatively short herbaceous appendage and very broad strongly erose scarious margin; corolla mostly less than 15 mm. long, deep indigo blue ..... 10a. *P. R. ssp. typicus*  
 Calyx-lobes with relatively long herbaceous appendage and narrower body including the narrower scarious entire or moderately erose margin; corolla mostly 15-18 mm. long, lighter blue or purplish ..... 10b. *P. R. ssp. aggregatus*

10a. *Penstemon Rydbergii* ssp. *typicus* nom. nov.

*Penstemon Rydbergii* A. Nels., Bull. Torr. Club 25:281, 1898. "It was met with in abundance in an aspen grove in a draw in the Laramie Hills, July 1, 1897. Type specimen collected at Green Top [Albany Co., Wyo.], in Herb. University of Wyoming, A. Nelson no. 3214." The type, which has been seen, is dated June 29, 1897; isotypes, NY, Po.

*P. erosus* Rydb., Bull. Torr. Club 28:28, 1901. "Colorado: Indian Creek Pass [Huerfano Co.], 1900, F. K. Vreeland, 615 (type)." Type studied, NY.

*P. lacerellus* Greene, Leaflets 1:161, 1906. "At Sargents', southern Colorado, 5 July, 1901, C. F. Baker, n. 352 as in U. S. Herb." Type from Saguache County, studied; also isotypes C,NY,Po,SU.

*P. latiusculus* Greene, loc. cit. "Stony ground along stream banks at Gunnison, Colo., 24 July, 1901, C. F. Baker, n. 588 as in U. S. Herb." Type studied, also isotypes C,NY,Po.

Moist subalpine parks in meadows and aspen thickets from southeastern Wyoming, southward on both continental slopes, through Colorado and eastern Utah to northern New Mexico and Arizona, at elevations from 2100-3350 meters.

## Representative collections:

WYOMING. Albany: Chug Creek, *Nelson 7311*; Antelope Basin, *Nelson 7473*; 6 mi. W. of Centennial, *Keck 913* (approaching ssp. *aggregatus*).

COLORADO. Larimer: Cameron Pass, *Zobel*. Grand: Shipier Park, C. B. & I. W. *Clokey 4265* (flowers almost as short as *procerus*, otherwise typical). Gilpin: Tolland, *Clokey 3862*. Lake: Tennessee Pass, *Rollins 1359*; Leadville, *Keck 834*. Mesa: Mesa Lakes, on Grand Mesa, *Keck 809*. Mineral: Goose Creek, *Murdoch 4803*. Hinsdale: Spring Creek Pass, *Hitchcock et al. 4098*. Archuleta: Pagosa Springs, *Bethel, Willey & Clokey 4272*.

NEW MEXICO. Colfax: Upper Merino Valley, *Nisbet 863*. Taos: Taos Canyon, 15 mi. E. of Taos, *Nisbet 860*. Sandoval: Valle Grande, *Jemez Mts., Castetter 675*.

UTAH. Uintah: Youngs Springs, *Goodding 1196*. Duchesne: betw. Mt. Emmons and Chain Lakes, *Graham 8475*.

ARIZONA. Coconino (?): The Basin, North Rim, Grand Canyon, *Purchase 2902* (Soil Conservation Service, Tucson). This collection recombines the characters of the two subspecies.

10b. *Penstemon Rydbergii* ssp. *aggregatus* (Penn.) comb. nov.

*Penstemon aggregatus* Penn., Contr. U. S. Nat. Herb. 20:367, 1920. "Type in the herbarium of the New York Botanical Garden, collected on margin of a draw on mountain side, conglomerate, 1 to 2 miles south of Evanston, Uinta County, Wyoming, altitude about 2,100 to 2,200 meters, in flower, June 26, 1915, by F. W. Pennell (no. 5918)." Type studied.

Moist sagebrush or wooded slopes from southwestern Montana southward, mostly to the west of the continental divide, to northwestern Colorado and through the Wasatch region of Utah to Kane County, at elevations from 1800-3140 meters.

Representative collections:

MONTANA. Beaverhead: T. I S., R. 18 W., Sec. 30, *White* 301 (USForestServ).

WYOMING. Sheridan: Piney Canyon, *Sharp* 185. Lincoln: Alpine, *Payson & Armstrong* 3487; Mt. Wagner, *do.* 3746. Carbon: Hilton's Ranch, *Osterhout* 1703. Sweetwater: North Vermillion Creek, *Nelson* 3585.

COLORADO. Larimer: W. side Cameron Pass, *Keck* 884. Jackson: Rabbit Ears, *Goodding* 1567. Routt: Steamboat Springs, *Goodding* 1606.

IDAHO. Teton: 8 mi. W. of Teton, *Christ & Ward* 10563. Bonneville: Caribou Mt., *Payson & Armstrong* 3593. Custer: Mt. Borah, *Christ & Ward* 10436, *Davis* 2036. Cassia: Spring Creek at Hereford Station, *Collam* 3020.

UTAH. Box Elder: Rosver Creek Mts., *Collam* 4581. Summit: Bear River, *E. B. & L. B. Payson* 4843; Park City, *Keck* 759. Wasatch: Strawberry Reservoir, *Keck* 769. Utah: Soldier Summit, *Keck* 783. Emery: summit Huntington Canyon, *Keck* 707. San Pete: head of Ephraim Canyon, *Keck* 695. Iron: Cedar Breaks, *Hilchcock et al.* 4566. Kane: 17 mi. W. of Gravel Junction, *Boyle* Z 381.

This species develops several morphological trends. In southern Wyoming the corollas are barely 10 mm. long, but they gradually increase in size southward until in northern New Mexico they are 18 mm. long. A glance at the map, figure 8, shows that this is a continuous distribution through the Colorado Rockies, but the southernmost collections are quite detached from *aggregatus*, which spreads well to the westward. Along this Colorado line the anther-sacs increase in size in proportion to the corolla. The New Mexico material is like *aggregatus* (with its large flowers) also in paler corollas, but it retains the broadly scarious sepals of northern typical *Rydbergii*. It is for these reasons considered to be an integral part of *typicus* rather than a form of *aggregatus*.

Intermediates between the two subspecies cover quite an extensive territory in southern Wyoming and northern Colorado. The westward progression from ssp. *typicus* to ssp. *aggregatus* is about as uninterrupted as the north-south trend within ssp. *typicus*, but it is marked by gradual ecological changes. Ssp. *typicus* is found in the subalpine parks of the Rockies, whereas *aggregatus* is usually associated with sagebrush at somewhat lower elevations. Some characters pointed out when *aggregatus* was proposed as a species did not take into account all of the material that should have been referred to *Rydbergii*. For instance, both forms are sometimes puberulent within the inflorescence in northern Colorado. There is no absolute difference in corolla-size or -color, and the calyx characters, which are the most useful, intergrade. The two units do, however, represent excellent subspecies.

# 11. PENSTEMON GLOBOSUS (Piper) Penn. et Keck

Figs. 2 and 9

*Penstemon confertus* var. *globosus* Piper, Bull. Torr. Club 27:397, 1900. "Wallowa Mts., northeastern Oregon, altitude 6000-7000 ft., *W. C. Cusick*, no. 2328, Sept. 1, 1899." The type, from Eagle Creek, Baker Co., studied, US: isotype C.

- P. attenuatus* var. *glabratus* G. N. Jones, Res. Stud. State Coll. Wash. 2:127, 1930. "Alder Creek, near Benewah, Benewah County [Idaho], June 19, 1927, G. N. Jones 679 (type in Herb. State College of Washington)." I did not find the type at Pullman, but at the University of Washington, Seattle.
- P. globosus* Penn. et Keck, Carnegie Inst. Wash. Publ. 520:294, 1940.

Stems slender to stout, 2.5-4 (-6.5) dm. tall; rosette well developed; herb-age bright green, glabrous throughout; leaves thin, basal lanceolate, acute, tapering to the slender petiole often as long as the blade, the whole 5-18 cm. long, up to 25 mm. wide, cauline lanceolate or oblong to ovate, obtuse or acute, amplexicaul or even cordate-clasping, scarcely reduced below the inflorescence; inflorescence often a dense, many-flowered capitulum, or of 2-4 verticillasters, the upper congested, the lower often remote and on erect peduncles up to 5 cm. long; calyx 5.5-8 (-10) mm. high, the lobes oblong or obovate, abruptly narrowed to the lance-subulate tip, the margin prominently scarious and usually erose; corolla a bright intense blue or blue-purple, (13-)15-20 mm. long, gradually ampliate, to 7 mm. wide pressed, the ridged palate slightly to prominently bearded with yellowish hairs; anther-sacs oval, pouch-like, not dehiscent quite to the free end or through the partition, denticulate-ciliolate, 0.7-0.9 mm. long; staminode included, densely bearded for half its length with golden yellow hairs, the tips  $\pm$  dilated.  $n=16$ .

West-central Idaho to northeastern Oregon, usually in boggy meadows, sometimes on drier grassy or gravelly slopes, at elevations from 950-2500 meters.

Representative collections:

IDAHO. Shoshone: between Emerald Creek and Clarkia, Christ & Ward 7650. Latah: Collins, Beattie 4139. Clearwater: 5 mi. E. of Elk River, Christ & Ward 12140. Idaho: Shisaler Creek, Gray 61; Heaven's Gate, Davis 2390; Hibbs Cow Camp, Dry Diggins, Packard 313; Burgdorf, Davis 2571. Valley: Brundage Mt., Constance & Pennell 1962. Washington: Cuddy Mts., Jones 6492. Boise: Garden Valley, Christ 1805. Custer: Cape Horn, Macbride & Payson 3515. Blaine: Galena Summit, Tucker 526A. Elmore: Deer Park, MacFadden 15637a.

OREGON. Wallowa: Summit of Imnaha-Snake Divide, 23 miles above Imnaha, Peck 17545; Ice Lake Trail, Eastwood & Howell 3325; between Douglas and Moccasin Lakes, Keck 373. Baker: near Cornucopia, Thompson 13347.

This is one of the most showy members of the *Proceri*, with its large, intensely blue flowers much congested in the inflorescence. Notable features of the species are the pouch-like anther-sacs, which are neither confluent nor at all explanate, and the broad-margined calyx-lobes. Anther-sacs of this type recur in *P. attenuatus militaris*, a supposedly hexaploid form that is cohabitant with the tetraploid *globosus*, and which is believed to have arisen by amphiploidy, with *globosus* as one of its parents. This is discussed further under *P. attenuatus*. Otherwise, this type of anther is not duplicated in the subsection, and its origin cannot be traced to any known diploid species.

The broadly scarious calyx-lobes of *globosus* reappear also in *attenuatus militaris* and in *flavescens*, another hexaploid species, and may have developed within *globosus*. Such lobes suggest a connection with *P. Rydbergii*, although *typicus* of that species, with the best morphological connection, is much farther



removed geographically than its ssp. *aggregatus*. In other words, *globosus*, a tetraploid, is easier to relate to hexaploid species, than to those on either the diploid or tetraploid levels.

## 12. *PENSTEMON EUGLAUCUS* English

Figs. 2 and 9

*Penstemon euglaucus* English, Proc. Biol. Soc. Wash. 41:197, 1928. "Open sandy slopes, Blue Grass Ridge, Mt. Hood, Hood River Co. [Oregon], August 6, 1927. English 816 (type in Herb. State College of Wash.)." Type, collected at 5,000 ft. elevation, seen.

Stems slender to rather stout, 1.5-5 dm. tall; rosette well developed; herbage glabrous and  $\pm$  glaucous throughout; leaves rather firm, basal narrowly to broadly elliptic, tapering to a short petiole, 4-10 cm. long, up to 25 mm. wide, cauline linear-oblong to lance-ovate, the upper amplexicaul; thyrsus strict, of  $1.5 \pm$  remote many-flowered verticillasters; calyx 3.5-5 mm. high, the lobes broadly oblong-obovate with an abrupt caudate tip  $\frac{1}{2}$  as long as the

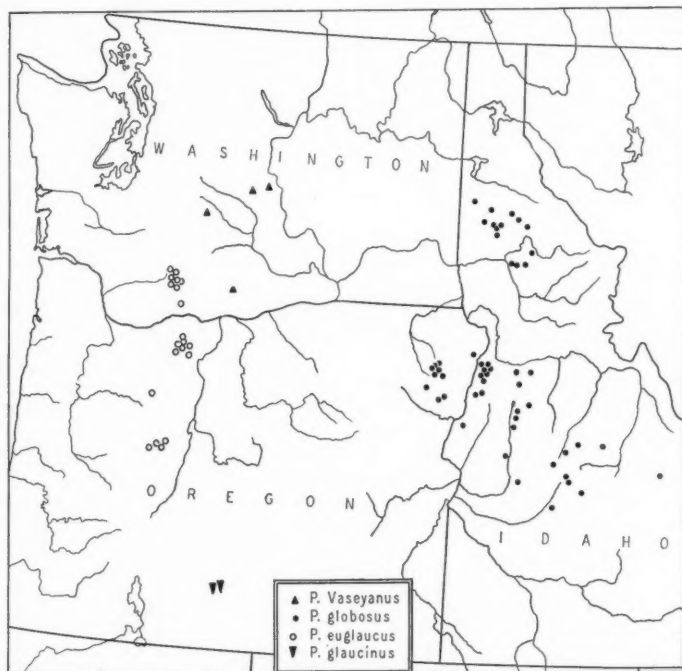


Fig. 9. Distribution of *Penstemon Vaseyanus*, *P. globosus*, *P. euglaucus*, and *P. glaucinus*.

body, the prominent scarious margin  $\pm$  erose; corolla deep blue, 11-15 mm. long, moderately ampliate, the small limb flaring, the scarcely ridged palate lightly yellow-bearded; anther-sacs narrowly ovate, dehiscent throughout but not explanate, 0.5-0.7 mm. long; staminode reaching orifice, lightly to more densely tufted with short golden hairs at the linear or slightly dilated apex.  $n = 24$ .

Cascade Range, from Mount Adams, Washington, southward to Three Sisters, Oregon, usually in dry volcanic ash in forest openings, at elevations from 1200-1850 meters.

Representative collections:

WASHINGTON. Yakima: Gotchen Creek Guard Station, 10 mi. N. of Trout Lake, July 5, 1936, Zuberbuhler (Pul); Wodan's Vale, Mt. Adams, Suksdorf 6911; Mt. Adams, Thompson 11155. Skamania: Chiquash Mts., Suksdorf 3390.

OREGON. Hood River: Blue Grass Ridge, Thompson 11215; Iron Creek to Hood River Meadow, Abrams 11450; 2 mi. S. of Sherwood Forest Camp, Keck 5192. Wasco: Eight Mile Creek, 3900 ft., G. N. Jones 4064; foot of Cascades, 3.5 mi. W. of Friend, Lawrence 144. Marion: Breitenbush Lake, Peck 18815. Lane: W. of McKenzie Pass, Feudge 1841, in part (Po). Deschutes: W. of Sisters, edge of bog (unusual habitat), Gale 303a (J. W. Thompson herb.); McKenzie Pass, Peck 16973.

Some plants from Mount Hood have anthers like *oreocharis*; others from there and the ones from Mt. Adams have anthers like *globosus*. The latter type of anther is elsewhere found only in *attenuatus militaris*. The circumstantial evidence from morphology is indicative of an amphiploid origin of hexaploid *euglaucus* from diploid *oreocharis* and tetraploid *globosus*.

### 13. PENSTEMON HETERODOXUS A. Gray

Figs. 1 and 10

Stems slender, often decumbent at base, 0.8-2(-3.5) dm. tall; rosette developed; leaves deep green, thin, basal linear-oblancoolate to spatulate, 1.3(-5) cm. long including the very slender petiole as long as blade, cauline oblanceolate to spatulate-oblong below, narrowly to broadly lanceolate and amplexicaul above; inflorescence usually reduced to a capitulum, sometimes with 2-4 discrete verticillasters, dense, very glandular; calyx 3-6 mm. high, the lobes oblong, abruptly narrowed to the short acute tip, the scarious margin  $\pm$  erosulate; corolla deep blue-purple, 10-16 mm. long, gradually ampliate, the limb expanded, lips equal, the slightly ridged palate prominently brownish-yellow-bearded; anther-sacs broadly ovate, boat-shaped, rarely explanate, 0.7-1 mm. long; staminode included, moderately bearded with short stiff yellow hairs toward the undilated apex or occasionally glabrous.  $n=8$ .

#### KEY TO SUBSPECIES

- Stems slender, mostly 8-15(-25) cm. tall; basal leaves 1-4 cm. long, 4-8 mm. wide, middle cauline up to 3 cm. long and 8 mm. wide. Plumas Co., Calif., southward to Mt. Whitney region; White Mts. .... 13a. *P. h. ssp. typicus*
- Stems stouter, mostly 15-40 cm. tall; basal leaves 3-7 cm. long, 6-12 mm. wide, middle cauline up to 6 cm. long and 12 mm. wide. Southern Sierra Nevada in Fresno and Tulare counties largely to the west of the Kern River ..... 13b. *P. h. ssp. cephalophorus*

13a. *Penstemon heterodoxus* ssp. *typicus* nom. nov.

*Penstemon heterodoxus* A. Gray, Syn. Fl. 2(1):269, 1878. "High mountain near Donner Pass, in the Sierra Nevada, California, Torrey." Type, at Gray Herbarium, Torrey no. 396, collected in 1865, studied. This is a moldy specimen with broader, and hence more prominent, cauline leaves than usual, although this kind is occasionally found elsewhere, as in Yosemite Park (Middle McCabe Lake, Keck 5006). The name given referred to the occasional occurrence of an antheriferous staminode, but this aberration has not been noted in other than the type collection.

*P. geniculatus* Greene, Pittonia 3:310, 1898. "Common on alpine slopes, below retreat-

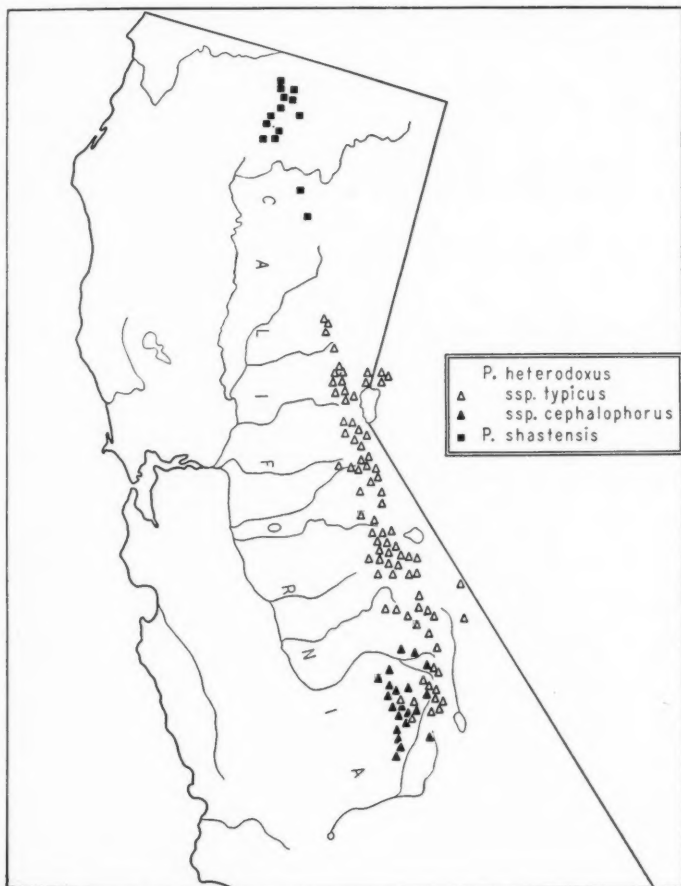


Fig. 10. Distribution of *Penstemon heterodoxus* and *P. shastensis*.

ing snow banks, in wet clayey or gravelly soil, in the Sierra Nevada of California, August to October." No collection or collector mentioned. Pennell and Keck have independently accepted the following sheet as the type: Silver Lake, Amador Co., Calif., 7200 ft. elevation, Sept. 20, 1892, *George Hansen* (ND). This sheet is labelled "*Pentstemon geniculatus*, Greene" in Greene's hand. This is the more common rosette-forming type of *typicus*.

- P. alsinoides* Greene, Leaflets 1:162, 1906. "Near Big Cottonwood Meadows, Sierra Nevada, Calif., 20 Aug., 1891, F. W. Koch, Death Valley Exp. n. 2138, as in U. S. Herb." Type studied. The same form as the preceding.
- P. depressus* Greene, *loc. cit.* "At 13,000 feet in the White Mountains, Mono Co., Calif., Aug., 1888, W. H. Shockley." The type, so marked by Greene, is Shockley no. 467, in the U. S. National Herbarium; studied.
- P. procerus* f. *geniculatus* Smiley, Univ. Calif. Publ. Bot. 9:325, 1921.
- P. confertus* var. *geniculatus* Jeps., Man. Fl. Pl. Calif. 914, 1925.

In the Sierra Nevada of California from Plumas County to the Mt. Whitney region, in the White Mountains, and in adjacent Nevada; in the Hudsonian and Arctic-Alpine life zones, on gravelly or rocky slopes, or in the "short-hair" meadows, at elevations from 2000-3500 (-3900) meters.

Representative collections:

NEVADA. Washoe: Contact Pass, Mt. Rose, *Kennedy 1267*; Third Creek, near Mt. Rose, *Howell 14094*.

CALIFORNIA. Plumas: Mt. Elwell, *Head*; Long Lake, *Head*; Gold Lake. Sierra: Salmon Lake, *Sutcliffe*. Nevada: Soda Springs, *Jones 2561*; Summit Station, *Heller 7007*. Eldorado: Gilmore Lake, *Abrams 6828*; Echo Lake, *Heller 12538*. Alpine: Carson Pass, *Yates 3938*; Highland Lake, *Albertus 330*. Mono: Sonora Pass, *Wiggins 9253*; Ink Rocks, *Peterson 563*; Hunewill Lake; Snow Lake; Lundy; Slate Creek, *Keck & Clausen 3859*; Dana Plateau, *Keck 4964*; Mono Pass, *Eastwood 536*; San Joaquin Mt., *Howell 16867*; Mammoth. Tuolumne: Emigrant Meadow, *Peterson 366*; Smedberg Lake; Matterhorn Canyon; Mt. Lyell. Mariposa: Vogelsang Pass, *Schreiber 1885*; Mt. Hoffmann; Lake Tenaya. Madera: Isberg Peak; Buena Vista Peak; Garnet Lake, *Howell 16443*; Agnew Meadows. Inyo: Mosquito Flat, Rock Creek, *Halperin 601*; Piute Pass, *Ferris 8943*; Onion Valley, above Independence, *Kerr 24*; Ibex Park, Mt. Whitney, *Rose 35452*. Fresno: Red Mt.; Evolution Lake; Mt. Goddard, *Hall & Chandler 663*; Martha Lake, *Ferris & Lorraine 9185*; Rae Lake. Tulare: Mt. Brewer, *Purpus*; betw. Reflection Lake and Harrison Pass, *Howell 16041*; East Lake; Whitney Creek, *H. M. & G. R. Hall 8434*; Alta Peak, *Larson*; Lower Kaweah Lake, *Dudley 1684*; White Chief Mine, near Mineral King, *Hall & Babcock 5652*.

In Eldorado County there are two fairly distinct forms: first, the usual type, with basal rosette of elliptic long-petioled leaves, lance-oblong to narrowly ovate cauline leaves, 1 or 2 verticillasters in the inflorescence, flowers large, 15-16 mm. long, 4.5 mm. wide pressed, the palate lightly bearded along the ridges; the second, less common type tends to be taller, without definite rosette (habit like *P. cinicola*), linear-oblancoelate leaves, 3-4 verticillasters and these not so crowded, flowers small, 12 mm. long, 2.5 mm. wide pressed, the palate more densely bearded but at orifice only. This may be what was described as *P. confertus* var. *rigidus* Jeps. (Man. Fl. Pl. Calif. 914, 1925), but I was unable to locate the type (*Jepson 7742*, Brockway, Lake Tahoe) in the Jepson Herbarium. This form is largely confined to the region just southwest of Lake Tahoe, but the two forms grow together and evidently intergrade. This is believed to represent only intra-ecotypic variation, and hence not deserving of a name, although it is of a rather spectacular nature.

13b. *Penstemon heterodoxus* ssp. *cephalophorus* (Greene) comb. nov.

*Penstemon cephalophorus* Greene, Leaflets 1:79, 1904. "Summit Lakes [Summit Lake, Tulare Co., Calif.], at 11,000 feet, Culbertson, 19 Aug., 1904, Baker's n. 4551." Type seen, ND: isotypes C, CAS, Po. The type collection was distributed as from an elevation of 12,000 feet, but Summit Lake lies at 9300 feet, with the highest peak nearby only 10,050 feet high.

*P. glastifolius* Greene, op. cit. 1:162, 1906. "Mineral King, Sierra Nevada, Calif., 3 Aug., 1891, Coville & Funston, n. 1449, as in U. S. Herb." Type studied. This is the extreme robust form, the type of *cephalophorus* from a higher elevation being more reduced, but the two represent the same systematic unit.

In addition to the characters mentioned in the key, this subspecies is usually distinguishable from *typicus* in having 2-4 verticillasters in the inflorescence (although even on the most robust stems these are frequently reduced to one as in the type) and in the usually bearded staminode. In Tulare County, ssp. *typicus* is strictly alpine, small-flowered, usually 1-verticillastered, and usually has a glabrous staminode. It is found principally to the east of the Kern at elevations from 2900-3600 meters, whereas ssp. *cephalophorus* occurs largely to the west of the Kern at elevations from 2130-3200 meters.

Subalpine and alpine gravelly slopes and meadows in the southern Sierra Nevada of Fresno and Tulare counties.

## Representative collections:

CALIFORNIA. Fresno: Rae Lake, *McCracken* (SU); Upper Paradise Valley, *Alexander & Kellogg 2614* (C, an unusual form with pale, lax flowers); Horse Corral Meadows, Tulare: Big Meadow; Twin Peaks Lake, Mt. Silliman; Deadman Meadow; Whitney Creek at Crabtree Meadows, *H. M. & C. R. Hall 8446*, in part, with *typicus* and intermediates; Kaweah Meadows, Chagoopa Plateau, *Howell 17725*; Moraine Lake; Hockett Meadows, *Culbertson in Baker 4462*; Mountain Lake, Upper Tule River, *Dudley 936*; Volcano Creek, *Hall & Babcock 5455*; head of Belknap Creek; Bonita Meadow, *Hall & Babcock 5174*.

14. *Penstemon shastensis* sp. nov.

Figs. 1 and 10

Caulibus gracilibus vel aliquanto validis 2-5 dm. altis; foliis viridibus glaberrimis, imis 3-6 cm. longis ellipticis obtusis anguste petiolatis, inferis caulinis maximis usque ad 9 cm. longis 16 mm. latis, superis caulinis amplexicaulibus; thyrsos moderate glanduloso-pubescenti stricto; cymis (2-6 geminis) multifloribus, imis pedunculosis erectis; calyce 2.5-5 mm. longo, segmentis oblongo-lanceolatis acuminatis subintegris inferne anguste scarioso-marginatis; corolla coeruleo-purpurea 10-13 mm. longa paulatim ampliata obscure bilabata, limbo expanso, labiis aequalibus, palato aliquanto copiose piloso; loculis antherae ovatis cymbaeformibus nec explanatis 0.6-0.7 mm. longis; filamentis sterili incluso apici dense aurato-barbato.  $n = 16$ .

Type: *David D. Keck no. 5172*, Dudley Herbarium of Stanford University, collected on meadow borders at Grass Lake, Siskiyou County, California, at 1540 meters elevation, June 13, 1940; isotypes C, CAS, CI, Ph, Po.

Occasional in meadow places in the Transition and Canadian zones of Siskiyou and adjacent Modoc counties, California, to eastern Shasta County;

one doubtful station also in Del Norte County; occurring at elevations from 1370-2375 meters.

CALIFORNIA. County uncertain: Emigrant Springs, lava beds, June 1894, *Austin* (C). Modoc: without specific locality, 1893, *M. S. Baker* (C). Siskiyou: Bray, *Heller* 15269, *L. E. Smith*; Goosenest Mountain, *Buller* 934, 1591; 24 mi. N. of Weed on Klamath Falls road, *Gould & Beach* 645; Bear Springs, Mount Shasta, *Cooke* 11212, *Eastwood*; Panther Creek, Mount Shasta, *Cooke* 13670; near Horse Camp, Mt. Shasta, *Jaekel*; Harris Spring, *Heller* 13716; McCloud, *Eastwood* 1123, *L. E. Smith* 501; Bigelows, McCloud River, *Eastwood* 10840. Del Norte: near Warmcastle, Aug. 13, 1899, *Dudley* (SU). Shasta: Goose Valley, *Eastwood* 708; Great Spring, Hat Creek, *Hall & Babcock* 4273.

This tetraploid is possibly an autopoloid derivative of *P. heterodoxus typicus* that has found an unoccupied niche to the north of, and at lower elevation than, that species. Conceivably, also, *shastensis* could be an amphiploid out of *heterodoxus* and *oreocharis*, for it has the habit of the latter and fewer glands than *heterodoxus*.

#### 15. PENSTEMON GLAUCINUS Penn.

Fig. 9

*Penstemon glaucinus* Penn., *Notulae Naturae* 71:10, 1941. "Type, lodge-pole pine forest, Campbell Lake, east of Gearhart Mountain, Lake County, Oregon, collected in flower July 21, 1932, by Elmer I. Applegate, no. 7922, in Herb. Academy of Natural Sciences of Philadelphia." Isotype seen, SU.

Stems slender, 3-3.5 dm. tall; rosette well developed; herbage glaucous; leaves thickish, basal elliptic to broadly spatulate, tapering to a slender petiole half as long to twice as long as blade, 2-6 cm. long (including petiole), 7-13 mm. wide, cauline broadly oblong to lance-oblong, sessile or amplexicaul; thyrsus glandular-pubescent, of 2-4 rather dense  $\pm$  remote verticillasters, the lower on short appressed peduncles; calyx 3.5-6 mm. high, the lobes lanceolate to ovate-oblong, attenuate, the entire or erosulate margin prominently scarious; corolla blue-purple, 12-15 mm. long, gradually ampliate, to 5 mm. wide pressed, rather obviously bilabiate, limb expanded or upper lip erect, the ridged palate moderately bearded with prominent yellow hairs; anther-sacs ovate, boat-shaped, not fully explanate, 0.65-0.95 mm. long; staminode included, densely bearded at undilated apex with short golden hairs or glabrous.

In addition to the type collection the species is known only from the following, also from Lake County, Oregon: south slope of Gearhart Mountain, dry lodgepole pine forest, July 20, 1932, *Applegate* 7892 (C, SU).

The relationships of *P. glaucinus* remain uncertain in part because of its isolated position. It may be closest to *attenuatus militaris*, but it also suggests *euglaucus*. A connection with *globosus*, which might be anticipated following these suggestions, is not apparent in the sepals or anthers.

#### 16. PENSTEMON ATTENUATUS Dougl. ex Lindl.

Figs. 2 and 11

Stems slender to rather stout, 3-6(-9) dm. tall; rosette well developed; leaves deep green, usually entire or sometimes finely denticulate, basal linear-

lanceolate to oval, tapering to a slender petiole often *ca*, equaling blade, acute or obtuse, 4-10(-17) cm. long in all, 7-20(-45) mm. wide, cauline gradually or abruptly reduced, the upper amplexicaul; thyrsus glandular-pubescent, strict, of (1-)3-7  $\pm$  congested many-flowered verticillasters, the lowermost on erect peduncles up to 5 cm. long; calyx 4-7 mm. high, the lobes commonly lanceolate, acuminate, with narrow scarious subentire margin, or the lobes ovate or obovate with sharply acute or acuminate tip, the more prominently scarious margin  $\pm$  erose; corolla pale yellow or various shades of blue-purple, 12-17(-22) mm. long, moderately to rather strongly ampliate, rather obviously bilabiate, the limb  $\pm$  flaring, or the upper lip erect and lower lip (1 mm. longer) reflexed, the scarcely ridged palate moderately to amply bearded with whitish hairs; anther-sacs ovate, not explanate, 0.7-1.2 mm. long; staminode reaching orifice, densely bearded with relatively long golden hairs at dilated uncinat tip or less densely for half its length.  $n = 24$ .

## KEY TO SUBSPECIES

Corolla more than 10 mm. long (rarely only 10 mm. in *militaris*).

Anther-sacs dehiscent throughout.

Stems 3-9 dm. tall; calyx-lobes lanceolate, narrowly scarious; corolla yellow or blue-purple, 14-20 mm. long. Pine woods, 1500 m. or below, northern Idaho westward ..... 16a. *P. a. ssp. typicus*

Stems 2-3.5 dm. tall; calyx-lobes ovate-oblong, more prominently scarious; corolla blue-purple, 12-16 mm. long. Mountain slopes, 1700-3200 m., Montana to Wyoming ..... 16b. *P. a. ssp. pseudoprocerus*

Anther-sacs usually not dehiscent quite to the free end nor through the connective, opening by a slit; corolla bright blue-violet, 10-16 mm. long; calyx-lobes broader, with prominently scarious and erose margin. Mountains of central and southern Idaho, 1600-2800 m. .... 16c. *P. a. ssp. militaris*

Corolla 7-10 mm. long. Local in marshy places in the Blue Mts., Oregon..... 16d. *P. a. ssp. palustris*

16a. *Penstemon attenuatus* ssp. *typicus* nom. nov.

*Penstemon attenuatus* (as *attenuatus*) Dougl. ex Lindl., Bot. Reg. 15:t. 1295, 1829.

"A native of the mountains of Lewis and Clark's River, where it was found by Mr. Douglas." (That is, Craig Mountains, Idaho.) Type, doubtless in the Lindley Herb., not seen. A photograph and notes by H. M. Hall of a fruiting specimen in Herb. Benthamianum, which seems to belong to the type collection, have been available.

*P. Digitalis* var. *attenuatus* Trautv., Bull. Acad. St. Petersb. 5:345, 1839.

*P. propinquus* Greene, Leaflets 1:166, 1906. "Blue Mountains, Oregon, at 8,250 feet. F. V. Coville, 13 July, 1896, n. 549, as in U. S. Herb." Type studied; taken near Strawberry Butte, in Grant County. This form from the fringes of the distribution of the species has corollas only 11-14 mm. long, of minimum size for this subspecies. In this character it closely approaches ssp. *palustris* of the same general region. Under that subspecies it is discussed further.

*P. veronicaefolius* Greene, op. cit. 167. "Known to me only as collected by Sandberg, in Idaho, in 1892, the type from Lake Waha, n. 245, and larger plant with leaves all entire, from Viola, Latah Co., n. 479." The type sheet, at U. S. National Herbarium, has slightly denticulate upper leaves. Consequently, Piper reduced the species to synonymy under his toothed-leaved *P. pinetorum* (= *Wilcoxii*). However, isotype sheets at Pomona and Stanford are entire-leaved, showing the variation in the type collection in this respect. While the great bulk of the collections of *attenuatus typicus* are entire-leaved, a few with obscurely denticulate leaves are admitted to it from this region of Idaho and from the Blue Mountains of Oregon.

*P. confertus* var. *attenuatus* Jones, Contr. West. Bot. 12:62, 1908.



- P. Nelsonae* Keck et Thoms., *Rhodora* 37:419, 1935. "Type: burned over land at base of Mt. Angeles, Olympic Range, Clallam County, Washington, at 550 m. (1800 feet) altitude, June 9, 1934, *J. William Thompson* 10617 (Dudley Herbarium of Stanford University \* \* \*)." This robust yellow-flowered form with denticulate leaves is probably adventive on Mt. Angeles, either as a garden escape, or as a result of broadcast seed.
- P. attenuatus* ssp. *hyacinthinus* Penn., *Notulae Naturae* 71:8, 1941. "Type, coniferous forest, alt. 5300-5500 ft., Beargrass Mountain Ridge, east of Beargrass Lookout, northeast of Elk City, Idaho County, Idaho, collected in flower July 12, 1937, by Francis W. Pennell, no. 20879; in Herb. Academy of Natural Sciences of Philadelphia." Isotype seen, CI.

Pennell maintains that "the actual species bears constantly pale yellow corolla and is a plant of low altitudes in northern Idaho and adjacent Washington and Oregon," and that "there also occur at higher elevations plants exceedingly variable in corolla-color or constantly and often darkly violet-blue. The latter show usually shorter sepals, those of *attenuatus* being so attenuate as to have suggested the specific name. For the violet-blue plant I now propose subspecific rank, considering the variably colored plant as a form of it."

From this statement one would infer that perhaps two ecotypes were involved, with hybrid swarms connecting them. However, this does not appear to be the case. In northeastern Oregon the violet-blue forms are prevalent at lower elevations than the yellow form—a reversal of the situation as known to Pennell in Idaho. Furthermore, the violet-blue forms are not limited to high elevations in Idaho, but come down to 1500 feet, while the yellow forms ascend as high as 6500 feet. It appears that the two forms may occur in pure populations even rather close together, but many times they mix and in those colonies a great variety of shades is found. That these mixed populations are not infrequent is shown when reasonably large suites of specimens from Idaho are assembled, and Pennell cites nine collections he made of them in describing the form below.

Finally, while it is true that the yellow-flowered forms are not found in southern Idaho, but elsewhere rather well cover the range of *typicus*, their presence in the north does not mark a recognizable ecotype, so far as one can determine without experiment. Since the yellow and blue forms and the numerous recombinations between them appear to be parts of one natural unit, they must bear the same name.

- P. attenuatus* ssp. *hyacinthinus* forma *multicolor* Penn., *loc. cit.* "—typified by my number 20926. It came from an opening in coniferous forest, 3250-3400 ft. alt., Brown Creek, near Lolo Creek, Clearwater County, Idaho, was collected in flower July 16, 1937, and is in the herbarium of the Academy of Natural Sciences of Philadelphia." Not seen. This is the variably colored plant that appears to be a hybrid recombination of the pale yellow and violet-blue forms.

Stems 3-6(-9) dm. tall; leaves entire or sometimes finely denticulate; inflorescence of 3-7 clusters; calyx-lobes mostly lanceolate, with relatively narrow and entire scarious margin; corolla pale yellow or blue-purple to violet, mostly 14-20 mm. long; anther-sacs ovate, boat-shaped, not explanate but opening by more than a slit, dehiscent through the connective and quite to the apex, mostly 0.8-1.2 mm. long.

Frequent in pine woods through northern Idaho, to central Washington and eastern Oregon, mostly at relatively low elevations (below 1500 meters).

Representative collections:

IDAHO. Kootenai: Lake Couer d'Alene, *McCalla* 4465. Shoshone: Forks of St. Marys River, *Leiberg* 1133; Avery; Clarkia. Latah: Potlach, *Constance & Clements* 1797. Clearwater: Weippe, *Davis* 3593, Lewis: 3 mi. E. of Craigmont, *Constance & Rollins* 1703; Forest. Idaho: Lolo Trail; Kamiah; Indian Hill, *Davis* 3497; Hemlock Butte, *Constance* 2024; Orogrande; White Bird Summit, *Davis* 3280; Seven Devils Mts. Valley: *McCall*, *Tucker* 74.

WASHINGTON. Chelan: Chumstick Mt., Thompson 8481, 14981; Mt. Stuart, Sandberg & Leiberg 549. Spokane: Mica Peak, Suksdorf 8835; Spokane; Freeman; Latah Creek. Whitman: Kamiak Butte, Keck 5342; Ewan; Colfax. Garfield: Tucanon River canyon rim, Constance & Clements 1749. Asotin: Anatone, Eastwood & Howell 3244A. Columbia: Stayawhile Spring, St. John & Smith 8361; Godman Springs.

OREGON. Wallowa: Sunset Point; Flora, Eastwood & Howell 3269. Union: Hilgard, Keck & Clausen 3616; Kamela. Umatilla: Gibbon, Heller 10186; Toll Gate; Meacham; Emigrant Hill, Keck & Clausen 3601. Baker: Baker City, Jones 25550; Anthony Lake, Rollins & Chambers 2615; Piles Canyon, Cusick 3808. Harney: Sawtooth Peak, Blue Mts., Henderson 9150.

16b. *Penstemon attenuatus* ssp. *pseudoprocerus* (Rydb.) comb. nov.

*Penstemon pseudoprocerus* Rydb., Mem. N. Y. Bot. Gard. 1:346, 1900. "Montana: Bridger Mountains, June 12, 1897, Rydberg & Bessey, 4919 (type)." Type seen in the New York Botanical Garden; isotype Pul.

*P. pseudohumilis* Rydb., op. cit. 347. "Idaho: Mt. Chauvet, July 29, 1897, Rydberg & Bessey, 4915 (type)." Type seen in the New York Botanical Garden; isotype US.

*P. Owenii* A. Nels., Bot. Gaz. 34:32, 1902. "Collected again in 1899, August 16, by the writer, this time also on the Tetons [Wyoming] at an alpine station, no. 6516 being the type." Type seen, RM; isotype NY.

*P. procerus pseudoprocerus* A. Nels., in Coulter, New Man. Rocky Mt. 444, 1909.

*P. cephalanthus* Penn., *Notulae Naturae* 95:3, 1942. "Type, steep mountain slope, altitude 8500 to 8800 feet, west of a lake southwest of Twin Lakes, on range southwest of Anaconda, Deerlodge County, Montana, collected in flower July 28, 1938, by F. W. Pennell, F. B. Cotner, and R. L. Schaeffer, Jr., no. 23679; in Herb. Academy of Natural Sciences of Philadelphia." Isotype seen, CI. The usual form. Pennell failed to contrast his new entity with either of Rydberg's proposals from this region, but instead pointed out the differences between it and forms of *heterodoxus*, from the Sierra Nevada of California, which, of course, are considerably different.

Stems 2-3.5 dm. tall; leaves entire; inflorescence of 2-5 crowded clusters; calyx-lobes ovate-oblong, the rather prominent scarious margin subentire; corolla blue-purple, 12-16 mm. long; anther-sacs ovate, boat-shaped and like *typicus* except ca. 0.8 mm. long.

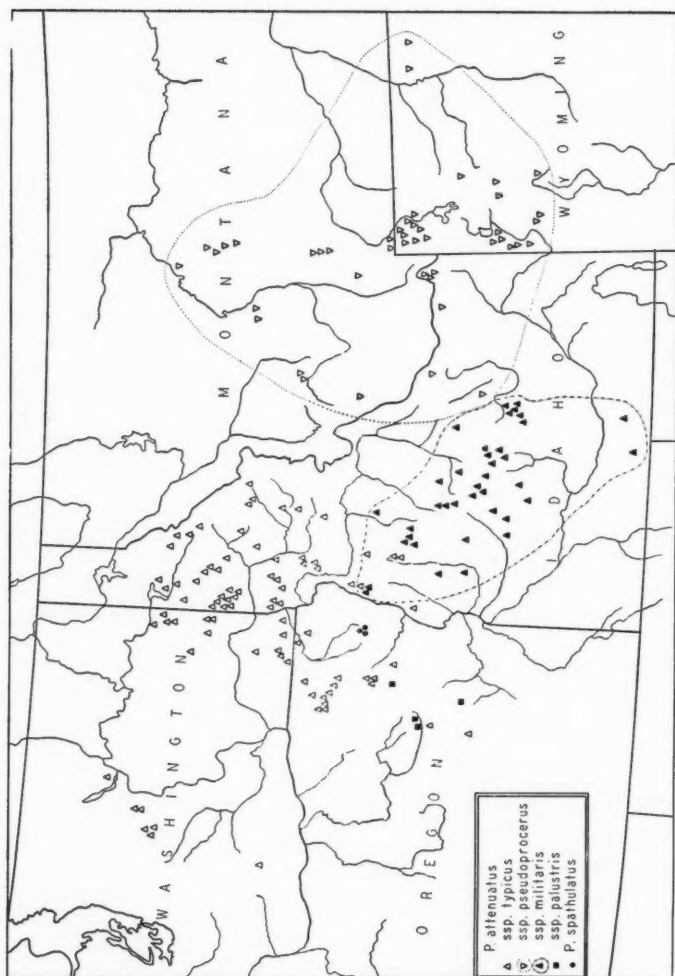
Mountain slopes of western Montana, mostly east of the continental divide, southward to northern and western Wyoming and eastern Idaho, at elevations from 1700-3200 meters.

Representative collections:

MONTANA. Cascade: Great Falls, Anderson 253; Monarch, Williams 181. Belt Mts. Meagher: Monument Peak, Little Belt Mts., Bradley. Lewis and Clark: Mt. Ascension, Butler 4001. Deer Lodge: Mt. Haggins, Jones (Po). Park: Beaver Lakes, Gardiner, Harrison 121. Gallatin: Bozeman, Blankinship 785. Madison: Jack Creek, Rydberg & Bessey 4916.

WYOMING. Park: Deer Creek Pass, Marston 134. Yellowstone Park: Mammoth Hot Springs, Pennell 6035. Teton: Bradley Lake, Williams 1347; Jackson Hole, E. B. & L. B. Payson 2228; Coal Creek, Teton Mts., Hall 11446; Teton Pass Mts., E. of Victor, E. B. & L. B. Payson 2091; Bryan Flats, Hoback Canyon, Williams 1181; Two Ocean Mt. Sheridan: headwaters of Tongue River, Tweedy 46. Sublette: Sheep Mt., Green River Lakes, E. B. & L. B. Payson 4517.

IDAHO. Fremont: Henry Lake, E. B. & L. B. Payson 2042. Clark: West Camas Creek, N. W. of Kilgore, Cronquist 1453. Lemhi: Eighteenmile Peak, Davis 1197 (CI, in part). Custer: Lost River Mts., near Clyde, Macbride & Payson 3150.

Fig. 11. Distribution of *Penstemon attenuatus* and *P. spatulatus*.

16c. *Penstemon attenuatus* ssp. *militaris* (Greene) comb. nov.

*Penstemon militaris* Greene, Leaflets 1:166, 1906. "Soldier Mountains, Idaho, L. F. Henderson, n. 3395, as in U. S. Herb." Type studied.

*P. assurgens* Keck, Amer. Midl. Nat. 23:609, 1940. "Type, from a moist draw, three miles north of Craters-of-the-Moon, Butte County, Idaho, at ca. 1750 m. elevation, June 28, 1938, Ray J. Davis 441 (Dudley Herbarium, Stanford University; isotypes C, CI)." This small-flowered form of ssp. *militaris* intergrades too completely with material to the westward to be maintained as a natural unit. It occurs on the eastern boundary of the range of *militaris*, where this subspecies is not far away from the range of ssp. *pseudoprocerus*. Perhaps the smaller size of the corollas of the *assurgens* form is influenced by the proximity of ssp. *pseudoprocerus*. The absence of a basal rosette is striking in *assurgens*, but this character, likewise, is subject to intergradation with material to the westward.

Stems 3-5 dm. tall; leaves always entire, the basal rosette sometimes poorly developed; inflorescence of 2 or 3 clusters or more frequently a dense many-flowered capitulum; calyx-lobes mostly broader, with prominent scarious margin as wide as the herbaceous portion and  $\pm$  erose; corolla deep blue-violet, mostly 10-16 mm. long; anther-sacs ovoid, usually not dehiscent quite to free end nor through the connective and opening by a slit, 0.6-0.8 mm. long.

Mountains of south-central Idaho, mostly at higher elevations than ssp. *typicus*, occurring from 1600-2800 meters.

## Representative collections:

IDAHO. Adams: Black Lake, Christ 8673. Valley: Elk Summit, Davis 2660; Warm Lake Summit, Christ 1783; Gold Fork Lookout, Thompson 13759; Green Tables Forest Camp, Thompson 13727. Custer: Livingston Mine, Davis 672; Double Springs Summit; Boulder Creek, Cronquist 3385; Jordan Creek, near Bonanza, Macbride & Payson 3450; Lolo Creek; Cape Horn, Macbride & Payson 3646; Stanley Lake, Thompson 14023; Toxaway Lake; Alturas Lake; Galena Summit, Macbride & Payson 3721. Boise: Pinehurst, Macbride 1693. Butte: Martin, Davis 2051. Blaine: Lava Lake, Davis 971; Iron Mt.; Wood River; Hyndman Creek, Thompson 13508; Ketchum, Nelson & Macbride 1196. Camas: Camas Prairie, Macbride & Payson 2918. Elmore: divide between Atlanta and Rocky Bar, Christ & Ward 8302; Trinity Lakes, Davis 2866. Cassia: Mt. Harrison, Davis 1355.

16d. *Penstemon attenuatus* ssp. *palustris* (Penn.) comb. nov.

*Penstemon palustris* Penn., Notulae Naturae 71:8, 1941. "Type, marshes, John Day River at Prairie City, Grant County, Oregon, collected in flower July 1, 1919, by Roxana S. Ferris and Rena Duthie, no 703; in Rocky Mt. Herb. at University of Wyoming; isotype in Dudley Herbarium at Stanford University." Type and isotype studied.

Differs from ssp. *typicus* in having corollas 7-10 mm. long, sepals correspondingly short, and anther-sacs 0.6-0.7 mm. long. It tends, also, to be somewhat less glandular.

Marshy places in the southern Blue Mountains, Oregon.

OREGON. Baker: 7 mi. N. of Sumpter, roadside marsh, Ferris & Duthie 1038 (SU). Grant: moist sunny bottoms of the South Fork, John Day River, near Prairie City, Henderson 5498 (CAS, SU); Ott Ranger Station, Malheur Forest, Beedon 64 (Pul).

This subspecies is poorly defined morphologically, because it intergrades in all characters with ssp. *typicus*. Greene proposed the name *propinquus* for a

collection from Strawberry Lake, near the type locality of *palustris* but in a different environment. The *propinquus* form has flowers that are only 10-14 mm. long, and it is here considered to represent the extreme reduction of ssp. *typicus*. The trend of reduction in flower-size in *typicus* can be followed from the rather large flowers in Umatilla County, through the smaller ones in Baker County, to this smallest extreme. This entire series, including *palustris*, is in fact not readily broken up into natural subunits. The question is: Is there a natural unit to designate, and, if so, what name should it receive? Because it is likely that *palustris* represents an incipient ecotype trending toward marshy habitats, the unit is maintained, and Pennell's name and type, which clearly represent the paludose habitat, are selected over the earlier name of Greene, which seems to have been given to a somewhat different form.

*Penstemon attenuatus* is the most variable species in the section *Spermunculus*. The probability is strong that it is not monophyletic. Many segregates have been proposed, as the synonymy shows, and yet there are no clear points of division revealed by morphology that would indicate the presence of any genetic barriers to interbreeding within the species as here recognized.

The limited cytological evidence favors the inclusive species here accepted. Only two other hexaploid species are known in the section as yet, so the three counts made in *attenuatus* are significant.

The hexaploid chromosome number of *attenuatus* is suggestive of an amphiploid, rather than of an autopolyploid, origin. The variation within the species is what might be expected in an amphiploid built up from various ecospecies belonging to one cenospecies. If the chromosomes of the parental genomes are partially homologous, this gives an added opportunity for increased variation. The multivalent association of chromosomes seen in meiosis indicates that such a situation exists, and this correlates with the observed morphological variation affecting almost all parts of the plant.

Because *P. attenuatus* is hexaploid, its parents are expected to have been a tetraploid and a diploid species. For the four subspecies the following origins are suggested (cf. fig. 5):

ssp. *typicus*,  $n = 24$ , from *P. confertus*,  $n = 16 \times P. albertinus$ ,  $n = 8$ , or diploid *P. Wilcoxii*.

ssp. *pseudoprocerus*,  $n = 24$ , from *P. procerus*,  $n = 16$ ,  $\times P. albertinus$ ,  $n = 8$ .

ssp. *militaris* (chromosome no. unknown) from *P. globosus*,  $n = 16$ ,  $\times P. albertinus$ ,  $n = 8$ .

ssp. *palustris* (chromosome no. unknown) offshoot from ssp. *typicus*.

All the character combinations found in *attenuatus typicus* would be expected in an amphiploid arising from diploid *Wilcoxii* or *albertinus* (which are considered closely related species of subsection *Humiles*) and tetraploid *confertus*. The glandular inflorescence, large flowers, and occasional toothed leaves could have originated with *Wilcoxii* or *albertinus*, and the yellow flowers and lanceolate, usually entire leaves with *confertus*. The pouch-shaped anthers and widely scarious-margined sepals of ssp. *militaris* pointedly suggest that

*P. globosus* is a likely ancestor of that subspecies, while the diploid parent must have contributed the glandular inflorescence. Finally, the smaller proportions throughout of ssp. *pseudoprocerus* encourage the view that it may have arisen from tetraploid *procerus* and a diploid species like *albertinus*.

In postulating these origins it was taken into account that the potential parents should be essentially cohabitant. There is a slight amount of intermixing between *attenuatus militaris* and *globosus*, and between *attenuatus typicus* and *Wilcoxii* where they meet. Within *attenuatus*, of course, there seems to be gene exchange among the subspecies. For instance, the pouch-shaped anther of *militaris* (which is less extreme on the periphery of the distribution of the subspecies, as in Cassia and Adams counties) is sometimes found in modified form, i. e., the anther is not dehiscent quite to the apex, in ssp. *typicus* all the way to the panhandle of Idaho. Despite such intergradation within *attenuatus*, there is no evidence of natural hybridization among *globosus*, *Wilcoxii* or *albertinus*, *procerus*, and *confertus*.

This would seem to emphasize a fact that has recently been pointed out (Clausen, Keck, and Hiesey, in press), that amphiploid species often serve as intermediaries for gene migration between their progenitors, which previously were genetically isolated from one another, as in the cultivated Brassicas, the European Galiums, etc. This potential increase in the variation can account for the fact that *attenuatus*, although probably of polyphyletic origin, exhibits a continuous series of variations from the characters of one parent to another, although the parents themselves appear to be effectively barred from freely exchanging their genes.

#### 17. PENSTEMON SPATHULATUS Penn.

Fig. 11

*Penstemon spathulatus* (as *spatulatus*) Penn., Notulae Naturae 71:10, 1941. "Type, open granitic soil, alt. 7800-8000 ft., below and around Ice Lake, head of Adams Creek, Wallowa Mountains, Wallowa County, Oregon, collected in flower July 28, 1937, by Francis W. Pennell, no. 21091; in Herb. Academy of Natural Sciences of Philadelphia." Isotype studied, CI.

Stems slender, several from a wide matted base, 1-2.5 dm. tall; rosette well developed; leaves rather firm, basal narrowly elliptic to oval, obtuse or acute, tapering to slender petiole as long as blade, 2-6 cm. long (including petiole), 6-18 mm. wide, cauline oblong-lanceolate, the upper often amplexicaul; thyrsus moderately glandular-pubescent, of 1-4 rather crowded congested many-flowered verticillasters; calyx 2.5-5 mm. high, the lobes lance-oblong to broadly ovate, acuminate, with entire to erosulate narrowly to broadly scarious margin; corolla violet-blue, 10-13 mm. long, gradually ampliate, to 5 mm. wide, the low-ridged palate sparingly to moderately bearded; anther-sacs elliptic to ovate, boat-shaped, not explanate, 0.6-0.8 mm. long; staminode reaching orifice, sparingly to densely golden bearded at the undilated apex.

Confined to the Wallowa Mountains, at elevations from 2300-2500 meters.

OREGON. Wallowa: dry north slope of Peets Point, Peck 18029 (SU); high dry slope of Pikes Point, Peck 17931 (SU); above Aneroid Lake, Rose 36593, 36614; Ice Lake, Peck 18564 (SU), M. & R. P. Ownbey 1840.

This is apparently a little removed from the other species of the subsection, although the glandular inflorescence places it near *attenuatus*. Its habit, somewhat reminiscent of *flavescens*, and the quite woody base suggest that *humilis* or *cinereus* might be in its ancestry.

# 18. PENSTEMON CONFERTUS Dougl. ap. Lindl.

Figs. 2 and 12

*Penstemon confertus* (as *confertum*) Dougl. ap. Lindl., Bot. Reg. 15:t. 1260, 1829. "A very common plant, according to Mr. Douglas, in open places, in mountainous Pine woods, in dry sandy soils, between Salmon River and the Kettle Falls in the Columbia, in the 48° north lat.;—" The plant in Lindley Herb. not seen, but isotype in Herb. Benthamianum, Kew, studied by Hall, and photographs of it are located at C.C.I.S.U. This sheet is labelled "Am. bor. occ. Douglas" in Bentham's hand.

*P. confertus* var. *ochroleucus* Trautv., Bull. Acad. St. Petersb. 5:344, 1839. New name for *P. confertus*.

Stems slender, 2.5 (-7) dm. tall; rosette well developed; leaves bright green, thin, basal lanceolate to oblanceolate, 3-7 (-10) cm. long, up to 20 mm. wide, on short slender petioles, cauline usually narrow, the upper often amplexicaul: thyrsus strict, of 2-7 dense verticillasters, the lower often well spaced and on appressed peduncles up to 5 cm. long; calyx 3-5 mm. high, the lobes lanceolate to broadly oblong, with abruptly acuminate or subulate tip much shorter than the body, very thin, the scarious margin usually much wider than the herbaceous portion and prominently erose; corolla pale sulphur yellow, not obviously declined, 8-10 (-12) mm. long, narrowly tubular, bilabiate, limb expanded, the ridged palate well bearded with light brown hairs; anther-sacs oval, essentially explanate, 0.4-0.5 mm. long; staminode included, with short tuft of brownish hairs on undilated apex. *n* = 16.

British Columbia and adjacent Alberta, southward to western Montana and northeastern Oregon, in grassy places or forest openings, at elevations from 300-1900 meters.

## Representative collections:

ALBERTA. Bow River Valley, 6 mi. south of Lake Louise, Howell 7828; Banff, Sanson.

BRITISH COLUMBIA. Kootenay: Yoho National Park; Glacier, Dudley (SU); Radium Hot Springs, Rose 37461; Toby Creek, McCabe 5114; Crowsnest Pass, McCabe 4825; 4 mi. N. of Corbin, McCabe 4819; Trail, Macoun 67864. Yale: Vernon, Anderson 779; Anarchist Mt., Thompson 14376.

MONTANA. Glacier: Midvale, Umbach 164. Glacier Park: trail to Grinnel Glacier, A. & R. A. Nelson 3142; St. Mary Lake, Maguire 1005. Flathead: Somers, Jones 8959. Lake: Wild Horse Island, Jones 8956. Sanders: Thompson Falls, Sandberg et al. 1030. Lincoln: Rexford, Jones 8958. Missoula: Copper Cliff, Hitchcock 1829. Mineral: Camel's Hump, Applegate 6433. Lewis and Clark: mouth of Ahorn Creek, Kirkwood 2316. Gallatin: Bozeman, W. W. Jones (C). Beaverhead: Big Hole Valley, Watson.

IDAHO. Bonner: Upper Priest Lake; Sandpoint, Davis 292-37. Shoshone: Clarkia Ranger Station, Quick 1133. Latah: Camp Laird, Palouse River, Constance & Clements 1781; Paradise Hills, Abrams 708; head of Little Potlach River, Sandberg et al. 406. Lewis: 3 mi. S. of Craigmont, Rollins 1116. Idaho: Red River Ranger Station, Davis 3319; Cecesh River, Davis 2572.

WASHINGTON: Pend Oreille: 3 mi. W. of Locke, Spiegelberg 390. Stevens: Gifford, Rogers 525. Ferry: Curlew, Otis 540. Okanogan: Omak, Fiker 659; Muckamuck



Lookout, Thompson 7013; Wauconda Summit, Thompson 8660. Spokane: Mt. Spokane, Smith 1131. Lincoln: Reardon, Benson 1614. Whitman: Pullman, Weber 2213. Adams: Ritzville, Sandberg & Leiberg 187. Chelan: Peshastin, Sandberg & Leiberg. Kittitas: Easton, Thompson 9006; Cle Elum, Thompson 11590. Yakima: North Yakima, Henderson (UW); Mt. Adams, Suksdorf 3292 (Pul). Klickitat: Bingen, Suksdorf 3736 (Pul).

OREGON. Union: La Grande, Jones 25552; Hilgard, Peck 17444; Starkey Range. Umatilla: Meacham, Keck 343; 5.2 mi. N.W. of Meacham, Keck & Clausen 3605. Sherman: Columbia River, N. W. corner of county, Applegate 6526 (SU).

This species is most closely related to the *procerus-Tolmiei* alliance, as shown by the small, essentially explanate anthers and the small flowers. It has developed the margin of the sepals to a degree not duplicated in the blue-flowered species. Otherwise, it is very similar to *procerus* except for the color of the flowers. It is remarkable that there is almost no evidence of hybridization between these two species.

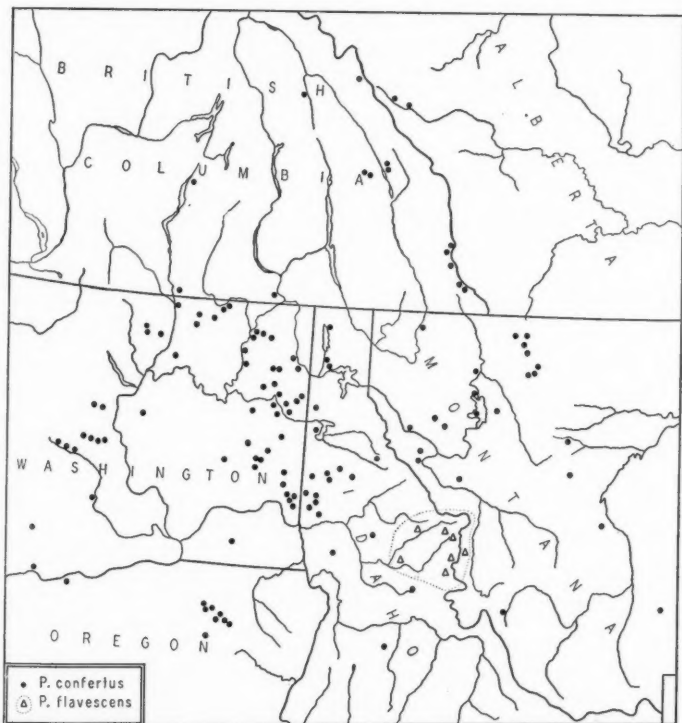


Fig. 12. Distribution of *Penstemon confertus* and *P. flavescens*.

19. *PENSTEMON FLAVESCENS* Penn.

Figs. 2 and 12

*Penstemon flavescens* Penn., *Notulae Naturae* 95:4, 1942. "Type, open alpine slopes, on granitic soil and in rock-crevices, altitude 6500 to 7000 feet, Coolwater Mountain, east of Lowell, Idaho County, Idaho, collected in flower July 13, 1937, by F. W. Pennell and Lincoln Constance, no. 20890; in Herb. Academy of Natural Sciences of Philadelphia." Isotype studied, CI.

Stems relatively stout, 1.5-4 dm. tall; rosette well developed; herbage deep green, turning blackish on drying; leaves coriaceous, basal lanceolate to elliptic, 3-12 cm. long (including the short stout petioles), 6-25 mm. wide, cauline lance-oblong, becoming amplexicaul; thyrsus of 1-3 or 4  $\pm$  confluent very dense and congested verticillasters, the whole frequently a dense capitulum; calyx 6-7 mm. high, the lobes oblong to ovate with subulate or caudate tip much shorter than the body, the scarious erose-lacerate margin much wider than the herbaceous portion; corolla pale yellow, 12-15 mm. long, gradually ampliate, to 6 mm. wide pressed, bilabiate, the ridged palate bearded with yellowish brown hairs; anther-sacs ovate, boat-shaped, not explanate, minutely denticulate-ciliate, 0.7-0.8 mm. long; staminode included, bearded with stiff golden hairs only at and near the undilated apex.  $n = 24$ .

Alpine slopes of the Bitterroot Mountains of western Montana and northern Idaho, at elevations from 1980-2450 meters.

MONTANA. Ravalli: Blodgett Pass, *Kirkwood & Severy 1575* (Ph).

IDAHO. Idaho: near Powell Ranger Station, *Davis 3607* (CI); Hoodoo Lake, *Christ 12819* (CI); Fridays Pass, *Kirkwood 1641* (CI, Ph); Lolo Trail, above Clearwater River, *Watson 307*; head of Bear Creek, *Leiberg 2953*; Fish Lake, *Epling & Kempf*; summit of Coolwater Mt., *Constance & Pennell 1986* (C, CI, Pul, UW).

*Penstemon flavescens* is a narrowly endemic hexaploid species that is thought to have arisen through amphiploidy. Because of the morphological similarity, one suspected parent is *P. confertus*, a tetraploid, but *flavescens* has acquired several characters that could not have come from that source, such as the boat-shaped anther-sacs, the black-drying foliage, the staminode bearded farther back from the apex, and the dilated corolla. The other parent is unknown. *Penstemon flavescens* has some characteristics of the tetraploid *globosus* in habit, dense inflorescence, sepals, etc., but it would require a diploid form of *globosus* to produce *flavescens* by crossing with *confertus*.

20. *PENSTEMON WATSONI* A. Gray

Fig. 13

Stems fairly stout, densely puberulent to glabrate, forming clumps 3-4 dm. across, 3-6 dm. tall; no rosette developed; leaves light green, not glaucous, glabrous or slightly puberulent, lanceolate, acuminate, 3-8 cm. long, lower cauline short-petioled, upper cauline amplexicaul; thyrsus of 2-6(-10) rather lax verticillasters, the lower on elongated erect peduncles, the upper much congested, the bracts foliaceous but much reduced upwards; calyx 2-3.5 mm. high, the lobes deltoid, with scarious  $\pm$  erose margin and acute to short-subulate tip; corolla light blue to deep gentian or blue-purple, the tube red-

purple, 12-17 mm. long, the throat slightly to rather strongly dilated (3-6 mm. wide pressed), the palate bearded with whitish hairs; anther-sacs oblong, finely denticulate-ciliate, boat-shaped, 0.8-0.9 mm. long; staminode reaching orifice, densely golden bearded for half its length, not dilated. E. Heitz (Abhandl. d. Naturw. Vereins Hamburg 21:49, 1927) gives the chromosome number as  $2n=(14)-16$ , but the source and determination of his material needs verification.

## KEY TO SUBSPECIES

- Corolla horizontal, somewhat dilated, the orifice only moderately bearded; anther-sacs oblong, boat-shaped, finely denticulate-ciliate, 0.8-0.9 mm. long. .... 20a. *P. W.* ssp. *typicus*  
 Corolla projecting upward, narrowly tubular, the orifice nearly filled with palatal beard; anther-sacs orbicular, peltately expanate, glabrous, 0.6 mm. long. .... 20b. *P. W.* ssp. *laxus*

20a. *Penstemon Watsonii* ssp. *typicus* nom. nov.

*Penstemon Fremontii* var. *Parryi* A. Gray ap. Wats., Bot. King's Expl. 218, 1871. "Colorado, (Parry.) Toyabe, Diamond and East Humboldt Mountains, Nevada; 6-7,000 feet altitude; July, August. S. Watson (773)." I have not seen the Parry specimen, but have seen *Watson 773* (GH, NY), collected July 1868, at Austin, Nevada.

*P. Watsonii* A. Gray, Syn. Fl. 2(1):267, 1878. Based upon the preceding, which is cited in synonymy.

*P. phlogifolius* Greene, Leaflets 1:164, 1906. "Castle Gate, Utah, M. E. Jones, 1894, sheet 237,290 U. S. Herb." Type seen, collected June 23, Jones 5486s; isotypes C, NY, Po.

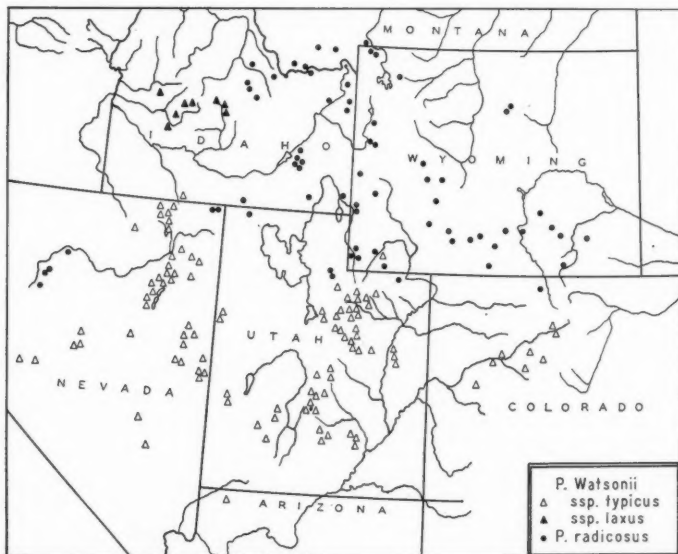


Fig. 13. Distribution of *Penstemon Watsonii* and *P. radicosus*.

Common on sagebrush or juniper slopes from western Colorado to southwestern Idaho, central Nevada, and northwestern Arizona, at elevations from 1750-3080 meters.

Representative collections:

WYOMING. Uinta: Fort Bridger, *Porter*.

COLORADO. Grand: Hot Sulphur Springs, *Ownbey* 889. Eagle: *Wolcott, Porter* 2047; 5 mi. E. of Sloss, *Keck* 823. Garfield: Grizzly, *Pennell* 6162. Mesa: 5.5 mi. above Mesa on road to Mesa Lakes, *Keck* 813.

IDAHO. Owyhee: rim of Bruneau River canyon, Nevada line, *Christ & Ward* 7943 (CI).

UTAH. Summit: Beaver Creek, *Cottam* 3519. Duchesne: Moon Lake, *Graham* 9384; Red Creek, *Graham* 9406, 9412. Carbon: Willow Creek Canyon, 10 mi. N.E. of Castle Gate, *Keck* 790. Grand: Post Canyon, *Graham* 9928, *Emery*: 19 mi. W. of Castle Dale, *Keck* 688; Blind Canyon, Garfield: Mt. Ellen, *Jones* 5684<sup>at</sup>. Utah: 3 mi. W. of Strawberry Summit, *Keck* 781; Soldier Summit, *Keck* 782. Tooele: Mt. Irapah, *Stanton* 1009. Sevier: Salina Experiment Station, *Keck* 673; Fish Lake, *Keck* 656. Piute: 7 mi. W. of Marysville, *Keck* 651. Beaver: Pine Grove, Wah Wah Mts., *Cottam* 8024, 8061; 13 mi. E. of Beaver, *Keck* 647. Iron: 8 mi. E. of Paragonah, *Rollins & Chambers* 2456.

ARIZONA. Mohave: Mokiak Pass, *E. Palmer* 377 (NY).

NEVADA. Elko: Coon Creek, *Holmgren* 1665; Copper Creek Basin, *Train* 630; Pine Mt., *Kennedy* 4449; Welcome, *Benson* 4639; Spruce Mt., *Holmgren* 1510; Terrace Guardhouse, Lamoille Canyon, *Mills & Beach* 1497; Sherman Ridge, S. end Ruby Range, 10,100 ft., *Hitchcock & Martin* 5652. White Pine: Schellbourne, *Jones*; Lehman Creek, Mt. Wheeler, *Cottam* 3294; Ward Mt., *Keck* 620. Eureka: Eureka, *Kennedy* 833. Lander: Bunker Hill, *Kennedy* 4096, 4165. Lincoln: Mt. Irish, *Purpus* 6328. Nye: summit between Nyala and Sharp, Quinn Canyon Range, *Jaeger*; Dobbin Summit, *Crane* 326; Sunnyside Creek, N. of Lone, *Beach & Mills* 889.

As has been mentioned by *Pennell*, the more eastern material has the more cuspidate-toothed calyx-lobes, but it is not possible to divide this material on that basis. The puberulence of the leaves is another variable character, shifting without directional trend. Material from Owyhee County, Idaho, has the boat-shaped anthers of *typicus* except for one plant in which they were observed to be approaching the type in the following subspecies.

#### 20b. *PENSTEMON WATSONII* ssp. *LAXUS* (A. Nels.) *Keck*

*Penstemon laxus* A. Nels., Bot. Gaz. 54:147, 1912. "Nelson and Macbride, no. 1196, Ketchum [Idaho], July 19, 1911." Type seen, RM; isotypes C, Po, Pul. Some of the material distributed under this number is referable to *P. attenuatus* ssp. *militaris*. *P. Watsonii* ssp. *laxus* *Keck*, Amer. Midl. Nat. 23:610, 1940.

In addition to the characters mentioned in the key, this subspecies is usually distinguishable from the preceding in having more narrowly lanceolate  $\pm$  puberulent leaves, the inflorescence densely congested at the apex of the stem, the few verticillasters rarely distinct, and the staminode sometimes only feebly bearded.

In dry meadows and sagebrush slopes of southwestern Idaho, at elevations from 1700-2400 meters.

IDAHO. Blaine: Wood River, 10 mi. above Ketchum, July 21, 1941, *Tucker* (CI); Galena Summit, *Tucker* 526. Elmore: Castle Rock, *Macbride & Payson* 2865; 5 mi. E. of Atlanta, *Christ & Ward* 8243; Atlanta, *Christ & Ward* 8338, *MacFadden*

15632; Deer Park, Boise Forest, MacFadden 15637b (CAS). Boise: Placerville, Tucker 147-37.

This unit is perhaps well enough marked and isolated to be treated as a species, but since it is obviously much closer related to *Watsonii typicus* than to any other member of the section, and since *Watsonii* as a whole is quite distinct from all other species, it is desirable to keep *typicus* and *laxus* within the same species until other evidence is forthcoming.

#### SUBSECTION 2. HUMILES

Plants usually tufted, often densely caespitose, the stems arising from branching suffrutescent root-crowns,  $\pm$  puberulent or glandular; basal rosette well developed (except in *radicosus*); leaves usually  $\pm$  dentate but often entire, glabrous to cinereous-puberulent; thyrsus of rather loose few-flowered verticillasters, sometimes very open, always glandular-pubescent; corolla blue or purple, mostly larger than in the *Proceri* and obviously bilabiate, the lower lip exceeding the upper, the throat  $\pm$  strongly 2-ridged, often much amplate, paler within but marked with guide lines of deeper color, the palate feebly to strongly white-villous; staminode often exserted, bearded at apex or for most of its length; capsule ovoid, glabrous or glandular.

#### NATURAL KEY TO THE SPECIES OF THE SUBSECTION HUMILES

- A. Basal rosette undeveloped; corolla strongly plicate, very pale ventrally the lower lip projecting .....21. *P. radicosus*
- AA. Basal rosette well developed; corolla merely ridged within, rarely pale ventrally.
- B. Calyx 2-5 mm. high, the lobes broadly lanceolate or broader; corolla blue-purple, moderately bilabiate, the limb spreading, the palate moderately ridged; staminode not prominently exserted; stems, at least,  $\pm$  pubescent below inflorescence.
- C. Leaves almost always entire, rarely obscurely toothed; stems densely caespitose.
- D. Leaves glabrous (usually puberulent in *humilis*); calyx 3-5 mm. high; corolla rather obviously bilabiate. Nevada and Idaho eastward.
- E. Basal leaves lanceolate to elliptic, flat, not appearing grasslike; calyx-lobes with narrow subentire scarious margin.
- F. Leaves finely puberulent and grayish (glabrate and greener in sspp.); corolla mostly 9-13 mm. long; anther-sacs 0.4-0.6 mm. long. Great Basin .....22. *P. humilis*
- FF. Leaves glabrous, bright green; corolla 11-17 mm. long; anther-sacs 0.5-0.8 mm. long. Rocky Mountains .....23. *P. virens*
- EE. Basal leaves linear-oblanccolate, folded or involute, grasslike; calyx-lobes with broad erosulate scarious margin. Montana.....24. *P. aridus*
- DD. Leaves cinereous-puberulent; calyx 2-3 mm. high (to 4 mm. high in ssp.); corolla obscurely bilabiate. Oregon and Washington.....25. *P. cinereus*
- CC. Leaves serrate (sometimes quite entire in *albertinus* and *suberratus*); stems less densely caespitose.
- G. Cauline leaves narrowly linear-lanceolate, sessile by a relatively narrow base; corolla 15-21 mm. long. Wallowa Co., Ore. ....26. *P. elegantulus*
- GG. Cauline leaves broader, sessile by a wide base (the upper cordate-amplexicaul except in *albertinus*).
- H. Inflorescence strongly glandular. Western B.C. to western Ore.
- I. Thyrsus narrowly paniculate, rather loose, not foliose; corolla 15-22 mm. long. West of the Cascades .....27. *P. ovatus*
- II. Thyrsus strict, narrow, foliose below; corolla 10-16 mm. long. East of the Cascades.
- J. Stems 1-3 dm. tall; leaves mostly obviously toothed; anther-sacs

- ovate to rotund, 0.5-0.7 mm. long .....28. *P. pruinosis*  
 JJ. Stems 3-8 dm. tall; leaves entire or obscurely toothed; anther-sacs narrowly to broadly ovate, 0.8-1.1 mm. long.....29. *P. subserratus*  
 HH. Inflorescence lightly to moderately glandular. Eastern B.C. to eastern Ore. and eastward.  
 K. Stems 1.5-4 dm. tall; basal leaves lanceolate to oval, 4-10 cm. long, 0.6-2 cm. wide, cauline lance-oblong, rounded at base; thyrsus sparingly or even obscurely glandular; anther-sacs 0.65-0.8 mm. long. ....30. *P. albertinus*  
 KK. Stems 4-10 dm. tall; basal leaves usually broader, 4-20 cm. long, 1-5 cm. wide, cauline lanceolate to broadly ovate, often cordate-amplexicaul; thyrsus more obviously glandular; anther-sacs 0.75-1.0 mm. long .....31. *P. Wilcoxii*  
 BB. Calyx 5-11 mm. high, the lanceolate lobes herbaceous throughout; corolla mostly lavender to purple or violet, strongly bilabiate, the short upper lip erect, the longer lower lip spreading, the palate strongly ridged; staminode prominently exerted.  
 L. Corolla 13-18 mm. long, 4-6 mm. wide pressed; calyx 4-7 mm. high; anther-sacs 0.8-1.1 mm. long .....32. *P. anguineus*  
 LL. Corolla, calyx, and anther-sacs larger.  
 M. Capsule glabrous; seeds with tight-fitting coat; leaves toothed. Coastal Ore.-Calif. ....33. *P. Rattanii*  
 MM. Capsule usually glandular-puberulent at apex; seeds with loose-fitting coat; leaves mostly entire. Subalpine; Rocky Mts. ....34. *P. Whippleanus*

## 21. PENSTEMON RADICOSUS A. Nels.

*Penstemon radicosus* A. Nels., Bull. Torr. Club 25:280, 1898. "Type specimens in Herb. University of Wyoming, [A. Nelson] no. 2962, Evanston [Wyoming], May 28, 1897." Type seen.

*P. lineolatus* Greene, Leaflets 1:164, 1906. "Known only as collected by myself in the West Humboldt Mountains, Nevada, July, 1894." Type seen, ND.

Stems slender, many, forming clumps 1.5-4 dm. tall; herbage  $\pm$  cinereous-puberulent throughout (the upper surface of the leaves sometimes glabrate), the inflorescence moderately glandular-pubescent; leaves gray-green, not glaucous, entire, linear-lanceolate to elliptic, acuminate to obtuse, 2.5-5.5 cm. long, lower cauline short-petiolate, upper cauline sessile but rarely amplexicaul; thyrsus short, compact, the rather short branches erect and few-flowered; calyx 4.5-6.5 mm. high, the lobes lanceolate to ovate with acuminate to attenuate tip and narrowly scarious entire margin; corolla blue, whitish ventrally, 16-21 mm. long, the throat gradually dilated upwards, the projecting lower lip exceeding the reflexed upper lip; anther-sacs lance-oblong, boat-shaped, finely denticulate-ciliolate, 0.8-0.9 mm. long; staminode reaching orifice, densely golden bearded for half its length.

Dry sagebrush-covered hillsides from Yellowstone Park region southward to northwestern Colorado and northern Nevada, at elevations from 1400-2500(-3000) meters.

### Representative collections:

MONTANA. Park: Gardiner River, Yellowstone Park, *Mearns* 870. Madison: St. Joe Creek, June 15, 1899, *W. Jones* (C); Cottonwood Creek, *Dobrinz* 52. Beaverhead: Lima, *Jones* 8953; *Monida*.

WYOMING. Washakie: Upper Ten Sleep Canyon, *Williams* 2322. Yellowstone Park: Mammoth Hot Springs, *A. & E. Nelson* 5634. Teton: Blacktail Butte, *Williams* 1755;

Hoback Canyon. Fremont: 10 mi. W. of Wind River, *Rollins & Costello 2057*; Birds Eye, *Nelson 9368*; 10 mi. S.W. of Lander. Sublette: 20 mi. W. of Big Piney, *E. B. & L. B. Payson 2611*. Albany: head of Sibylee Creek, *Ownbey 1035*; Rock River, *Gooding 27*; Centennial Valley; Rogers Canyon. Carbon: Freezeout Hills, *E. Nelson 4858*; Medicine Bow, *A. Nelson 9647*; Rawlins, *Pennell 5879*; N. of Baggs, *Osterhout 2633*. Sweetwater: Bush Ranch, *Nelson 7119*; Wamsutter, *Pennell 5883*. Lincoln: Cokeville, *Rollins 231*; E. of Afton, *Payson & Armstrong 3239*. Uinta: Lyman, *Rollins 1615*; 4 mi. N. of Lonetree.

COLORADO. Jackson: Pinkham Creek, *Gooding 1471*.

UTAH. Daggett: Sheep Creek, near Flaming Gorge, *Williams 545*. Summit: Echo; Coalville, *Jones*. Box Elder: Clear Creek, Rosver Creek Mts., *Cottam 4576*.

IDAHO. Fremont: Lamont, *Davis 217*; Juniper Hills near St. Anthony, *Quayle 177*. Teton: W. of Tetonla. Clark: Monida Pass, *McCalla 4763*. Bingham: Big Butte Station. Bannock: Pocatello, *Pennell 6064*, *Davis 3173*. Bear Lake: Montpelier, *Taylor 2243*. Lemhi: Big Creek, 3 mi. N. of Patterson, *Hitchcock et al. 3741*; Birch Creek, *Davis 3798*. Custer: 5 mi. E. of Chilly, *Christ & Ward 10364*; 4 mi. N. E. of Dickey, *Cronquist 3126*. Cassia: Silent City of Rocks, *Almo, Christ 12297*.

NEVADA. Elko: Goliher Pasture, 18 mi. N.E. of San Jacinto, *Maguire 16973*. Humboldt: Water Canyon, N. end Sonoma Range, *Train 221*. Pershing: Star Peak, *Heller 10636*.

In habit, *radicosus* is similar to *Watsonii*, which occupies similar environments in the region just to the south of it. But in the strongly plicate corolla, with its projecting lower lip and very pale ventral side, it is definitely related to the subsection *Graciles*. Its flower-color is of a deeper blue, however, than *gracilis*, which is the only member of the subsection that approaches it geographically and which has about the deepest colored corolla of any member of that subsection.

## 22. PENSTEMON HUMILIS Nutt. ex A. Gray

Fig. 14

Stems slender and numerous, forming dense clumps 1-3(-4.5) dm. tall; leaves gray-green or light green, rather firm, apically obscurely denticulate or usually entire, basal 2.5(-10) cm. long including the slender petiole *ca.* equaling the blade, 5-10(-25) mm. wide; thyrus strict, of 3-6(-9)  $\pm$  confluent few-flowered appressed verticillasters; calyx 3-5 mm. high, the lobes broadly lanceolate to broadly ovate, obtuse to short-acuminate, herbaceous or narrowly scarious-margined; corolla intense azure-blue to blue lavender with purplish tube, 9-13(-16) mm. long, 2.5-5 mm. wide pressed, nearly tubular or gradually ampliate, the lower lip usually exceeding the upper; anther-sacs ovate to round,  $\pm$  explanate, glabrous, 0.4-0.6 mm. long; staminode included or slightly exerted, prominently tufted with golden hairs at apex and sparingly bearded for  $\frac{1}{3}$  its length, the undilated apex often uncinat.

### KEY TO SUBSPECIES

- Herbage  $\pm$  puberulent below, grayish; stems uniformly clothed with lance-oblong leaves, the leaves of the rosette mostly lanceolate, tapering to petiole and apex, entire. Widespread, mostly in sagebrush, 1500-3000 m., Wyo. and Colo. to Idaho and Calif. .... 22a. *P. h. ssp. typicus*
- Herbage nearly glabrous below, bright green; stems uniformly clothed with mostly ovate-oblong rounded leaves, the leaves of the rosette ovate, obtuse, entire. Restricted to subalpine and alpine slopes, 2300-3350 m., northern Wasatch Mts. .... 22b. *P. h. ssp. brevifolius*



Herbage glabrate below, light green; stems slender, virgate, with reduced bract-like leaves, arising from a prominent rosette of oval to cordate obtuse or rounded  $\pm$  denticulate leaves. 1200-2000 m., local in southwestern Utah .....

22c. *P. h. ssp. obtusifolius*

22a. *Penstemon humilis ssp. typicus* nom. nov.

*Penstemon humilis* Nutt. ex A. Gray, Proc. Amer. Acad. 6:69, 1862. "Rocky Mountains, Nuttall (a very depauperate doubtless alpine specimen in herb. Acad. Philad.) \* \* \*." Gray included the following species (*virens*) in his description, but the name goes with Nuttall's plant (type seen, Ph; also photograph of isotype, BM), which doubtless was collected either in southwestern Wyoming or southeastern Idaho.

*P. collinus* A. Nels., Bull. Torr. Club 25:279, 1898. "Type specimen in Herb. University of Wyoming, [A. Nelson] no. 2960, Evanston [Wyoming], May 28, 1897." Type seen; the common form.

*P. puberulus* Jones, Contr. West Bot. 12:64, 1908. "Summit, Owen's Valley, California, 7000 ft. altitude, May 22, 1897 [Jones]." Type seen, Po (two sheets); isotypes C, US. This collection, from the extreme western extension of the species, connects in all details with material to the eastward. The only distinction of any moment in this westernmost material appears to be the slightly larger anthers.

*P. brevis* A. Nels., Bot. Gaz. 54:417, 1912. "Nelson and Macbride, no. 1457, Lemhi Forest, Mackay, Custer County, Idaho, July 31, 1911." The type, collected in rocks at summit of Bear Canyon, 10,000 ft. altitude, seen, RM; isotypes C, Po, SU, US. This alpine form of the species occurs on high peaks from central Idaho to eastern Nevada, but it intergrades by imperceptible steps with subalpine and lower forms, so that it could be recognized only by strictly arbitrary criteria. At Livingston Mine, for instance, at 9,000 ft., where *brevis* would be expected, we find plants 3 dm. tall, of near maximum height for the species in Idaho. In fact, some of the most robust forms come from 8,000 ft. elevation in Blaine County. (The other collection cited by Nelson, *Cusick* 1974, from Steins Mountain, Oregon, we refer to *P. cinereus*.)

Frequent as scattered colonies on rocky hillsides or sagebrush-covered slopes from Teton County, Wyoming, south to northwestern Colorado, and westward to Owens Valley, California, at elevations from 1500-3000 meters. The wide range of habitats occupied by *typicus* indicates that this subspecies contains more than one ecotype, but the absence of morphological distinctions makes it impossible to distinguish the plants of the sagebrush belt from those of alpine habitats.

Representative collections:

WYOMING. Teton: Jackson Hole; Teton Pass, *Williams* 778; Camp Creek. Sublette: Wyoming Range, W. of Merna, *E. B. & L. B. Payson* 2788; Piney Mt., *do.* 2681. Lincoln: E. of Afton, *Payson & Armstrong* 3248; Cokeville, *Nelson* 4549; 5 mi. W. of Kemmerer, *Payson & Armstrong* 3230. Sweetwater: Burnt Fork, *Tanner* 3915. Uinta: Big Muddy Creek, *Rollins* 2324.

COLORADO. Rio Blanco: White River, near mouth of Wolf Creek, *Graham* 9065.

UTAH. Daggett: Manila, *Rollins* 1689; Green Lakes; Deep Creek Camp. Uintah: Taylor Mt., *Graham* 6354; Brush Creek Canyon, *Gooding* 1289. Duchesne: 10 mi. W. of Duchesne, *Cottam* 7254. Cache: Spring Hollow, *Maguire* 13107. Utah: mouth of Provo Canyon, *Pennell* 6112; Strawberry Summit, *Keck* 777 (both of these collections distributed as *P. brevifolius*). Tooele: Mt. Ibapah, *Jones*; Dutch Mt., *Jones*. Juab: Eureka, *Jones*. Millard: Detroit, *Jones*. Sevier: Fishlake Forest, *Eggleston* 11127. Box Elder: Muddy Creek, Raft River, *Cottam* 3054.

IDAHO. Bannock: Pocatello, *Pennell* 6063; McCammon; Bannock Range. Bear Lake: Montpelier, *Macbride* 15. Cassia: Mt. Harrison, *Davis* 1287. Lemhi: Salmon, *E. B. & L. B. Payson* 1865; Birch Creek, *Davis* 1125; Lemhi Mts., near Patterson,

*Macbride & Payson 3192*. Custer: Salmon River Mts., near Bonanza, *Macbride & Payson 3442*; Livingston Mine, *Davis 563*; Alturas Lake, *Evermann 654*. Blaine: Iron Mt., 5 mi. W. of Martin, *Hitchcock et al. 3819*. Camas: Soldier Mts., near Corral, *Macbride & Payson 2888*. Valley: Gold Fork Lookout, *Thompson 13757*. Elmore: Atlanta, *MacFadden 15634*. Owyhee: Middle Fork, Bruneau River, *Christ & Ward 10611*.

NEVADA. Elko: Jarbidge, *Nelson & Macbride 1951*; between Lamoille Creek and Verdi Peak, Ruby Mts., *Rollins & Chambers 2572*; Cave Creek Canyon, *Mason 4794*. Humboldt: Lamance Creek, *Robertson 210*. White Pine: 7 mi. S.W. of Ely, *Keck 618*; Mt. Wheeler, 11,000 ft. elevation, *Rollins & Chambers 2478* (the *brevis* form). Lincoln: Pioche, *Minthorn 52*; Highland Peak, *Purpus 6315*; Mt. Irish, *Jaeger*. Nye: Reveille, *Purpus*; Reese River Valley; summit Kawich Mts., W. of Cedar Corral, *Jaeger*; Nixon Peak, *Barneby 3731*; Stonewall Mt., *Alexander & Kellogg 2466*. Mineral: White Mts., near Sunland, *Heller 10511*. Esmeralda: Montgomery Pass, *Ripley & Barneby 3705*; Columbus Marsh, *Jones*.

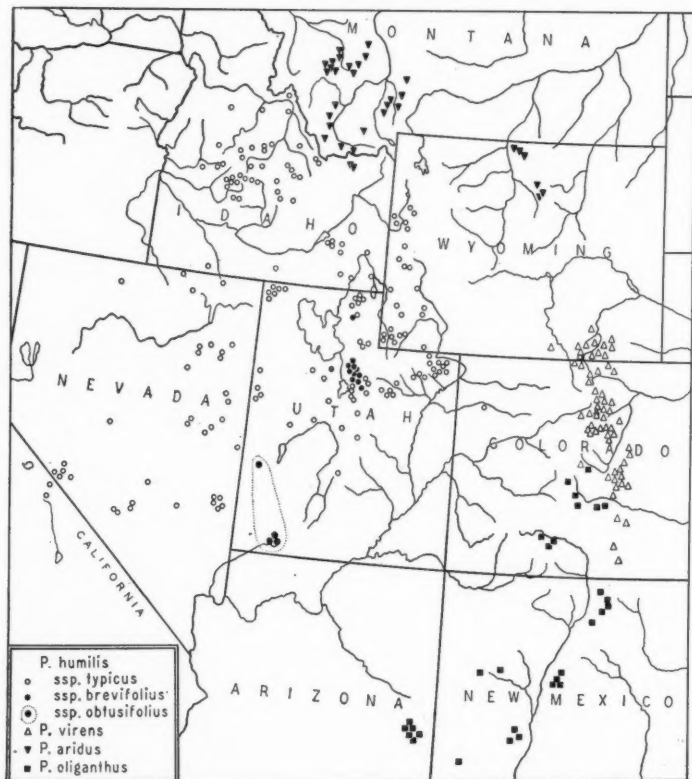


Fig. 14. Distribution of *Penstemon humilis*, *P. virens*, *P. aridus*, and *P. oliganthus* (treated on p. 204).

CALIFORNIA. Mono: Benton Station, June 17, 1927, Jones (Po).

The variation in this subspecies is not very great. In the eastern half of its range the flowers are quite uniform and rarely more than 13 mm. long. In the Deep Creek Range, western Utah, and in parts of southern Idaho and Nevada, the corolla increases in length at times to 18 mm., but in the same localities it is almost always found much smaller, too.

22b. *Penstemon humilis* ssp. *brevifolius* (A. Gray) comb. nov.

*Penstemon humilis* var. *brevifolius* A. Gray, Syn. Fl. 2(1):267, 1878. "*P. humilis*, var. ? Watson, l. c. [Bot. King's Expl. 220]—Utah in the Wahsatch Mountains, at 9,000 or 10,000 feet, Watson, Eaton." According to Watson, "In the Wahsatch Mountains; 9-10,000 feet altitude; July, August (781)." Watson 781, from Cottonwood Canyon, Utah, July 1869, isotypes seen, NY, US.

*P. brevifolius* A. Nels., in Coulter, New Man. Rocky Mt. 445, 1909.

This subalpine and alpine form of the northern Wasatch Mountains of Utah differs from *typicus* in its tendency to form low mats, in the bright green and glabrous lower leaves, in its more broadly ovate or broadly oval basal leaves, and in its broader cauline leaves that make the plants appear more leafy-stemmed. It occurs at elevations from 2300-3350 meters.

Representative collections:

UTAH. Cache: Pine Canyon, Wellsville Mts., Maguire 3133 (C), growing with *typicus*. Salt Lake: Alta, Keck 745; Brighton, Keck 750; Emigration Canyon, Pennell 5986. Wasatch: Snake Creek Canyon, above Midway, Keck 722; Strawberry Mts., Harvey 78. Utah: American Fork Canyon, Jones 1405; Mt. Timpanogas, Castle 9779.

22c *Penstemon humilis* ssp. *obtusifolius* (Penn.) comb. nov.

*Penstemon obtusifolius* Penn., Contr. U. S. Nat. Herb. 20: 370, 1920. "Type in the U. S. National Herbarium, no. 260682, collected at Springdale, Washington County, Utah, altitude 1,200 meters, in flower, May 16, 1894, by Marcus E. Jones (no. 5249am; distributed as *P. humilis brevifolius* S. Wats.)." Type seen; isotype Po.

In southwestern Utah, from Beaver County, to Zion National Park, Washington County, at elevations from 1200-2000 meters.

UTAH. Beaver: Pine Grove, Wah Wah Mts., Cottam 8079 (CISU). Washington: Zion National Park, Eastwood & Howell 1167, Fisk 7913, A. & R. A. Nelson 2706, Cottam 4753; Clear Creek Canyon, Zion Park, Eastwood & Howell 9238, Ripley & Barneby 4332.

The subspecies are rather poorly defined. They interlink with one another, but represent three distinct morphological trends. Subsp. *obtusifolius* is rather geographically isolated and well marked down at Zion Canyon, but collections from the mountain ranges of western Utah and eastern Nevada link it with ssp. *typicus*. Subsp. *brevifolius* is a rather natural unit, marked by its tendency to form bright green, prominently leafy mats, at subalpine and alpine elevations in the northern Wasatch Range, but it merges with *typicus* in all characters and certainly is not genetically isolated.

*Penstemon humilis* shows intergradations with several other species. As shown in figure 5, it has been found intergrading with *P. radicosus*, *albertinus*, *cinereus foliatus*, and *aridus*, all where their ranges come in contact with it in Idaho. There is an obvious close relationship between it and *virens*, which

occurs just to the eastward. An extra-sectional connection is found between *humilis typicus*, of central Idaho, and *P. pumilus* Nutt., of the section *Aurator*. These two species are distinguished by the quality of the pubescence in the inflorescence (*humilis* is glandular-pubescent, *pumilus* is cinereous-pubescent, with few gland-tipped hairs interspersed), and they perhaps hybridize in nature to some extent. There is an additional likelihood that *humilis typicus* may exchange genes occasionally with *P. Moffatii* ssp. *Marcusii* Keck, also of the section *Aurator*, in eastern Utah.

### 23. PENSTEMON VIRENS Penn.

Figs. 4 and 14

*Penstemon virens* Penn. ap. Rydb., Fl. Rocky Mts. 773, 1066, 1917. "Type: Stony hillsides, foothills north of Morrison, Colo., 1915, Pennell 5821 (N.Y.)." Type seen.

Stems slender, puberulent in lines, several to numerous, forming dense clumps 1-3.5 (4.5) dm. tall; leaves bright green, rather firm, glabrous, entire or sometimes obscurely dentate, basal lanceolate to elliptic, acute, 3-8 cm. long including the petiole as long as blade, 5-8 (-12) mm. wide, lower cauline obtuse, upper cauline lanceolate, acuminate, often rounded-amplexicaul; thyrus strict, rather dense, of 4-7 few-flowered appressed verticillasters, often leafy bracted below; calyx 2.5-5 mm. high, the lobes lanceolate to ovate, acute or acuminate, with narrow subentire scarious margin; corolla bright blue with purplish or violet throat, 11-17 mm. long, 3.5-7 mm. wide pressed, gradually to rather abruptly ampliate; anther-sacs broadly ovate, essentially glabrous, 0.5-0.8 mm. long; staminode reaching orifice, prominently bearded with golden hairs at apex and sparingly bearded for  $\frac{1}{3}$  its length, not uncinatate or dilated.  $n = 8$ .

Common on foothills and forested slopes along the eastern flank of the Rocky Mountains, from Albany County, Wyoming, to Las Animas County, Colorado, at elevations from 1650-2900 meters.

#### Representative collections:

WYOMING. Laramie: Horse Creek, Buffum 708. Albany: Cooper Hill, Nelson 8939; head of Pole Creek, Nelson 1322; Sand Creek, Nelson 7014; Centennial, Keck 909. Carbon: Encampment, Tweedy 4305.

COLORADO. Larimer: Virginia Dale, Ownbey 1024; Horsetooth Mt., Pennell 5853; Longs Peak Inn, Rose 39328. Jackson: Camp, Keck 893. Boulder: Boulder, Pennell 5826. Grand: 10 mi. E. of Granby, Rollins & Chambers 2404, 2405. Jefferson: Golden, Clokey 3861. Gilpin: Tolland, Pennell 6355. Clear Creek: Georgetown, Patterson 117; Grays Peak, Keck 866. Douglas: Castle Rock, Ownbey 1256. El Paso: Palmer Lake, Pennell 5807; E. slope of Pikes Peak, Keck 876; 10 mi. S. of Colorado Springs, Keck 867. Fremont: Canon City, Brandegee 418. Custer: St. Charles River, San Isabel City, Rollins 1219. Las Animas: Brantly Canyon, Osterhout.

The size of the flowers has been exaggerated in the literature, for throughout the range of the species the corolla is often only 12-13 mm. long, with the shortest mostly found in southern Wyoming. I have found none that measure over 17 mm.

The most obvious connection of this species is with *P. humilis* to the westward, but it shows a relationship with *P. gracilis*, of the subsection *Graciles*.

24. *PENSTEMON ARIDUS* Rydb.

Fig. 14

*Penstemon aridus* Rydb., Mem. N. Y. Bot. Gard. 1:348, 1900. "Montana: Spanish Basin, June 23, 1897, Rydberg & Bessey, 4920 (type)." Type seen, NY; isotypes GH, Ph, Pul, RM, US.

Stems slender, puberulent at least in lines, few to numerous from a compact crown, forming caespitose clumps 1-2.5 dm. tall; leaves firm, entire, pale green, glabrous except for the obscurely scabrid-denticulate margin, basal narrowly linear-oblongate, folded or involute, appearing grasslike, the blade tapering to a filiform petiole of ca. equal length, all 1.5-6 cm. long, cauline similar but sessile, narrowly linear, or the upper sometimes lance-attenuate and broadened to a rounded amplexicaul base up to 6 mm. wide; thyrus of 2-6 rather lax few-flowered verticillasters, but primary peduncles erect; calyx 3-5 mm. high, the lobes lance-oblong to rotund, with apiculate to short-subulate tip, the broad scarious margin erosulate; corolla blue or blue-purple, 11-17 mm. long, 4-6 mm. wide pressed, gradually ampliate; anther-sacs ovate to rotund, boat-shaped or  $\pm$  explanate, essentially glabrous, 0.6-0.8 mm. long; staminode reaching orifice, prominently yellow-bearded at the linear or  $\pm$  dilated tip.

Dry rocky hillsides in sagebrush or grassland, from western Montana and adjacent Idaho to the Big Horn Mountains of northern Wyoming, at elevations from 1500-2450 meters.

## Representative collections:

MONTANA. Lewis and Clark: Helena, Kelsey. Powell: Deer Lodge Valley, Jones (Po). Deerpole: Anaconda, Blankinship; Mill Creek, Jones. Silver Bow: Butte, Barkley & Jensen 2498. Jefferson: Pipestone Pass, Taylor 2017; Boulder, McCalla 4750; Kilborn Gulch, Park 13. Gallatin: Wallrock Basin, Suksdorf 264 (Pul); Bozeman, Anderson. Madison: Short Creek Bridge, Dobrinz 23; Cedar Mt., Rydberg & Bessey 4921. Beaverhead: Big Sheep Creek, Eggleston & Bowers 22032; Bannack, Munson B-32; Armstead, E. B. & L. B. Payson 1741; Lima, Rydberg 2782; Monida, Jones 8960.

WYOMING. Big Horn: 10 mi. E. of Kane, Big Horn Mts., L. O. & R. Williams 3010; Medicine Mt., do. 3037; South Paintrock Creek, do. 3150. Washakie: Upper Ten Sleep Canyon, Ownbey 801; Lower Ten Sleep Canyon, Williams 2321.

IDAHO. Clark: U. S. Sheep Experiment Station, N. E. of Dubois, Forsling 509, 512 (U. S. Forest Service).

This species intergrades slightly with *humilis typicus* in Lemhi County, Idaho. It appears to be well isolated from all other members of the section with the possible exception of *P. gracilis*.

25. *PENSTEMON CINEREUS* Piper

Figs. 4 and 15

Stems slender, few to numerous, often anthocyanous, forming clumps 1-4 or 5 dm. tall; herbage cinereous-puberulent up to the inflorescence; leaves rather firm, almost always entire (feebly toothed apically in some), basal lanceolate to narrowly ovate, acute or obtuse, 2-6(-9) cm. long including the very slender petiole 1-2.5 times as long as blade, upper cauline usually rounded amplexicaul; thyrus virgate, of 3-9 distinct few-flowered verticillasters, the cymes rather lax and on short divergent or appressed peduncles; calyx 2-3

(.4 in ssp.) mm. high, the lobes ovate, obtuse or acute, the obscurely scarious margin entire; corolla bright blue to blue-indigo or blue-purple, 10-15 mm. long, 2.5-5 mm. wide pressed, nearly tubular or gradually ampliate; anther-sacs ovate to rotund, boat-shaped or nearly explanate, glabrous 0.5-0.6 (-0.8 in ssp.) mm. long; staminode reaching orifice, prominently bearded with short golden hairs, the tip straight, undilated.  $n = 8$ .

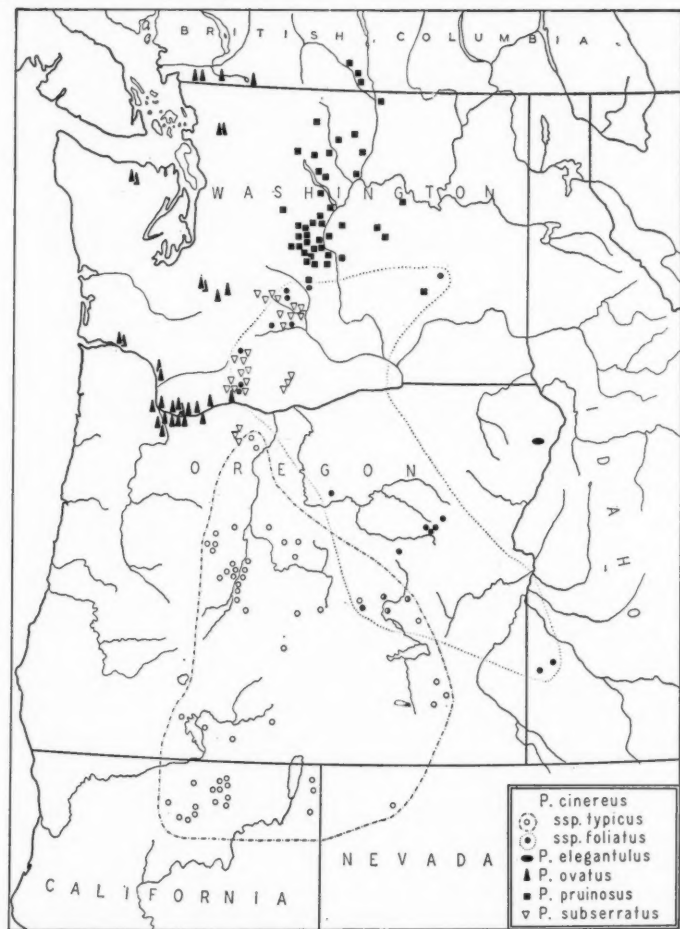


Fig. 15. Distribution of *Penstemon cinereus* (intermediates between the subspecies are indicated by half-shaded circles), *P. elegantulus*, *P. ovatus*, *P. prinosus*, and *P. suberratus*.

## KEY TO SUBSPECIES

- Rosette leaves mostly less than 5 cm. long and 8 mm. wide including petiole, the cauline leaves abruptly reduced and nearly linear, the herbage strongly gray-puberulent; corolla 9-13 mm. long; anther-sacs 0.5-0.6 mm. long; staminode bearded for 1/3 its length. In volcanic gravels. ....25a. *P. c. ssp. typicus*
- Rosette leaves mostly more than 5 cm. long and 8 mm. wide including petiole, the cauline only gradually becoming smaller and linear-oblong to oblong-lanceolate, the herbage greener; corolla 12-16 mm. long; anther-sacs 0.7-0.8 mm. long; staminode bearded at apex. In loam and serpentine.....25b. *P. c. ssp. foliatus*

25a. *Penstemon cinereus* ssp. *typicus* nom. nov.

*Penstemon cinereus* Piper, Contr. U. S. Nat. Herb. 16:209, 1913. "Type in the U. S. National Herbarium, no. 690798, collected in dry rocky ground at Bend, Crook [now Deschutes] County, Oregon, July 4, 1907, by Kirk Whited (no. 3055a)." Type, from "vicinity of Laidlaw," seen.

Common in volcanic gravels on sagebrush- or juniper-covered slopes to the east of the Cascades, from Wasco County, Oregon, to the north base of Mt. Shasta and to northwestern Nevada, at elevations from 1000-2200 meters.

## Representative collections:

OREGON. Wasco: Tygh Valley, *Peck* 17365; W. of Friend, *Lawrence* 261. Crook: Grizzly Butte, *Leiberg* 218; Ochoco Creek, *Cusick* 2635; Pilot Butte, *E. Nelson* 855; Hampton Butte. Jefferson: Grandview Road, *Gorman*. Deschutes: Metolius River, *Gale* 322; 7.5 mi. S. of Bend, *Keck* 5184; Paulina Lake, *Howell* 7087. Harney: Silvies River, 20 mi. above Burns; *Henderson* 9142 (CAS, toward ssp. *foliatus*); Myrtle Park, *Peck* 21004a (C); Harney Valley, *T. Howell* 448; bleak summits of Steins Mt., *Cusick* 1974. Lake: Ft. Rock, *Peck* 15714. Klamath: Bly, *Austin* 21; 10 mi. N. of Bonanza, *Peck* 15173; Rattlesnake Point, *Applegate* 3619.

CALIFORNIA. Modoc: Warner Mts., *Bruce* 2362; Duncan Horse Camp, *Howell* 12337. Siskiyou: Lava Beds National Monument, *Applegate* 9268, 9344, 9374, 9452, 9458, 9516, 6804, 10316; 11 mi. N.E. of Weed, *Johnson & Palmer* (C); Sheep Rock, Mt. Shasta, *Hall & Babcock* 4118.

NEVADA. Humboldt: sagebrush plains near head of Thousand Creek, 33 mi. S.W. of Denio, Ore., *Applegate* 8335 (SU).

25b. *Penstemon cinereus* ssp. *foliatus* ssp. nov.

A subspecies typical differt undique paulo majoribus, foliis viridioribus luxuriosioribusque, caulibus foliosioribus, corolla 12-16 mm. longa, loculis antherae 0.7-0.8 mm. longis.

Occasional from central Washington to the southern extremity of the Blue Mountains in Oregon, and in extreme southwestern Idaho, at elevations from 450-2100 meters. This subspecies differs as to its habitat from ssp. *typicus*, for it is found in loam or serpentine soils, rather than volcanic sands, and from yellow pine woods up to alpine slopes, as on Bald Mt., Washington.

Type: *Keck & Clausen* 3662, Dudley Herbarium of Stanford University (isotypes BM, C, CAS, CI, Co, F, G, GH, K, M, NY, Ph, Po, Pul, RM, US), from 3 miles west of the summit of Dixie Pass, Whitman National Forest, Grant County, Oregon, on serpentine hillsides in yellow pine forest at 1280 m. (4200 ft.) elevation, taken in flower June 22, 1935. This collection is diploid,  $n = 8$ , and was illustrated in Carnegie Institution of Washington Publ. 520, p. 267, where it was referred to *P. humilis* Nutt.



WASHINGTON. Adams: Ritzville, Sandberg & Leiberg 187 (CAS,Pul,US). Kittitas: Ellensburg, Whited 430 (Pul), 5/20/97, Piper (Pul); alpine slopes of Bald Mt., Thompson 14795 (CI). Yakima: Upper Wenas, H. W. Smith 617 (UW); Ahtanum Ridge, Heidenreich 245 (Pul); Tampico, Flett 1181 (CI,Pul,UW); Donner's (Klickitat) Glacier, E. side Mt. Adams, Suksdorf 3306 (Pul). Klickitat: Falcon Valley, Suksdorf 3306, 3214 (Pul).

OREGON. Grant: E. of summit of Dixie Pass, Keck & Clausen 3657 (CI,SU); 6 mi. N. of Prairie City, Applegate 6225 (CI,SU, toward *typicus*); 5 mi. N.E. of Prairie City, Constance & Beetle 2716 (C,CI,Pul); 10 mi. N. of Seneca, Thompson 11939 (CI,SU,UW, toward *typicus*). Wheeler: 7 mi. N. of Service Creek, Constance & Beetle 2713 (C,CI,Pul). Harney: 10 mi. S. of Myrtle Park, Peck 21037 (C, good *foliatus*, but *typicus* nearby).

IDAHO. Owyhee: Silver City, Macbride 912 (C,Po,RM,SU).

Through ssp. *foliatus*, *P. cinereus* evidently intergrades somewhat with *P. humilis typicus* in western Idaho, and shows obvious morphological relationships with *P. elegantulus*, of northeastern Oregon, and *P. pruinosus* of central Washington. In Washington this species is readily separated from *pruinus* and *subseratus*, both of which it meets, by the combination of entire and cinereous-puberulent (but not glandular) leaves.

## 26. PENSTEMON ELEGANTULUS Penn.

Fig. 15

*Penstemon elegantulus* Penn., Notulae Naturae 71:14, 1941. "Type, Cattle Camp at head of Horse Creek, Wallowa County, Oregon, alt. 5400 ft., collected in flower June 24, 1897, by E. P. Sheldon, no. 8387, in Rocky Mountain Herbarium, at the University of Wyoming." Type and isotype studied, RM.

Stems slender, few to numerous from a compact crown, forming clumps 2-3 dm. tall; herbage finely puberulent to the inflorescence, or the under surface of the leaves glabrate; leaves rather firm, sparingly serrate-denticulate, basal narrowly elliptic-ovate, acute, 3-7 cm. long including the slender petiole nearly as long as blade, 6-13 mm. wide, cauline narrowly linear-lanceolate, sessile by a relatively narrow base; thyrsus of 3-5 distinct few-flowered verticillasters, the somewhat lax cymules on short erect peduncles; calyx 3.5-4.5 mm. high, the lobes elliptic-oblong to broadly ovate, acuminate, the moderately scarious margin erose; corolla violet-blue (not seen fresh), 15-21 mm. long, 4.5-6.5 mm. wide pressed, gradually amplexate; anther-sacs narrowly to broadly ovate, boat-shaped or  $\pm$  explanate, microscopically muriculate, 0.75-1.2 mm. long; staminode reaching orifice, bearded at the straight or uncinat  $\pm$  dilated tip with a tuft of short golden yellow hairs.

An endemic known only from two collections taken at the head of the breaks of the Snake River—one, the type, from Wallowa County, Oregon, the other from across the river on plateau scablands at Joseph, Idaho County, Idaho, Christ 10196 (CI).

Morphologically this species is related to *P. cinereus foliatus* and *P. humilis typicus*, differing in the serrate leaves, the larger flowers and anthers, and distribution. It is further removed from *P. subseratus*, with which Pennell compared it, by the cinereous-puberulent herbage, the few-flowered thyrsus, the compact rosette, reduced cauline leaves, low stature but large flowers, and other

characters. Genetically it is probably closest of all to *P. albertinus*, some forms of which from west-central Idaho differ chiefly in the reduced amount of puberulence on the herbage and in the smaller anthers. Further field studies are required to determine whether *elegantulus* is adequately separable from *albertinus* as a species.

### 27. *PENSTEMON OVATUS* Dougl. ap. Hook.

Figs. 3 and 15

*Penstemon ovatus* Dougl. ap. Hook., Bot. Mag. 56:t. 2903, 1829. "Discovered by Mr. Douglas growing plentifully among limestone rocks on the high mountains about the Grand Rapids of the Columbia River, at the distance of one hundred and forty miles from the ocean; \* \* \*" Hooker's plate is clearly of the species here considered and was taken from a garden plant grown from Douglas' seeds. Several sheets of such are preserved at Kew, but the only Douglas specimen from the Northwest is a poor one of three leaves and capsules.

Stems several, hirtellous or glabrous below, 5-10 dm. tall; leaves bright green, thin, glabrous to sparingly hirtellous, sharply serrate-dentate, or the basal broadly lanceolate to ovate, abruptly contracted to a petiole usually shorter than the blade, acute or obtuse, 5-15 cm. long in all, 1.5-4 cm. wide, cauline triangular-ovate, 3-7 cm. long, 1.5-4.5 cm. wide; thyrsus of 4-10 rather loose many-flowered verticillasters, the lower on divergent peduncles 2-7 cm. long, the uppermost  $\pm$  confluent, the individual cymes simple, with pedicels of unequal length, or often compound; calyx 2-5 mm. high, the lobes lanceolate to ovate, with narrow scarious entire or erosulate margin; corolla deep blue or blue-purple, 15-22 mm. long, to 7 mm. wide pressed, obviously ampliate and bilabiate, the lower lip somewhat exceeding the upper, the palate villous or rarely glabrous; anther-sacs broadly ovate, nearly explanate, glabrous, 1 mm. long; staminode slightly exserted, prominently bearded for  $\frac{1}{3}$  its length from the falcate undilated tip, rarely glabrous.  $n = 8$ .

Damp rocky openings in the woods to the west of the Cascade crest from southern British Columbia to northern Oregon, at elevations from 10-550 meters.

#### Representative collections:

BRITISH COLUMBIA. Yale: Lake House, Skagit River, Macoun 76812. New Westminster: Chilliwack River, Spreadborough 76813; Sumas Mt., 8 mi. W. of Chilliwack, McCabe 3796, 3823; McKay Creek, Sumas Prairie, Racey 3627.

WASHINGTON. Skagit (?): Mt. Hamilton, Gorman 4518, 4593, 4621. Clallam: Hurricane Ridge, G. N. Jones 3253. Pierce: Eatonville, Flett 2206; Upper Nisqually Valley, Allen 16. Klickitat: bank of Columbia River, near Underwood, McCalla 5507. Skamania: Cape Horn, Suksdorf 10482; Mt. Prindle, Suksdorf 11699. Cowlitz: Woodland, Gould & Beach 1188. Clark: Mt. Pleasant, May 25, 1935, Thompson; Vancouver, Thompson 871. Wahkiakum: Cathlamet, Gorman (SU).

OREGON. Multnomah: Bonneville, Suksdorf 861; Sandy River, at Troutdale, Keck & Clausen 3449; Willamette River, Portland, Sheldon 10853.

*Penstemon ovatus* is a distinctive species that does not intergrade morphologically with any other. It is the only representative of the entire subgenus *Eupenstemon* to be found in the Humid Transition Zone from the Columbia River northward. In gross aspect it simulates *P. serrulatus* Menz. ex Sm., of the subgenus *Saccanthera*, which occupies the same area.

28. *PENSTEMON PRUINOSUS* Dougl. ex Lindl.

Figs. 3 and 15

*Penstemon pruinus* (as *pruinus*) Dougl. ex Lindl., Bot. Reg. 15:t. 1280, 1829.

"It was found by Mr. Douglas near the Priest's rapid of the Columbia, \* \* \*."

Photographs seen (C.C.I.S.U.) of an isotype sheet in Herb. Benthianum, Kew.

This is labelled, "Okanagan and Priest's Rapids. Jnt. of the Columbia. Dougl."

There is a duplicate in Herb. Hookerianum. All, like the plate, are of the form with herbage minutely puberulent below the inflorescence.

*P. amabilis* G. N. Jones, Res. Stud. State Coll. Wash. 2:126, 1930, "Washington: on partly wooded slopes, Blewett Pass, Kittitas Co., June 23, 1930, *Elias Nelson* 1682 (type in Herb. State College of Washington)." I did not find the type at Pullman, but at the University of Washington, Seattle. This is the form with herbage essentially glabrous below the inflorescence.

Stems clustered, 1-3 (-6) dm. tall; herbage variably viscid-puberulent throughout, sometimes quite densely cinereous below; leaves thin to rather firm, finely and sharply (sometimes obscurely) serrate-denticulate, basal lanceolate to ovate, 5-10 cm. long including the slender petiole once to thrice as long as the acute blade, 7-20 (-35) mm. wide, cauline oblong to lance-ovate; thyrsus of 3-7 rather loose many-flowered scarcely confluent verticillasters, the peduncles appressed; calyx 3-5 mm. high, sometimes anthocyanous, the lobes lanceolate to oblong, acuminate or acute, narrowly scarious-margined, entire; corolla deep blue-purple, 10-16 mm. long, 2-4 mm. wide pressed, tubular or slightly ampliate, the lower lip obviously larger than the upper, the rounded palate feebly bearded or glabrous; anther-sacs ovate to rotund, boat-shaped or nearly explanate, glabrous, 0.5-0.7 mm. long; staminode reaching orifice, bearing a tuft of short yellow hairs at undilated sometimes uncinat apex.  $n = 8$ .

Sagebrush land or pine-covered slopes from southern British Columbia to central Washington, east of the summit of the Cascade range, at elevations from 300-2000 meters.

Representative collections:

BRITISH COLUMBIA. Yale: Keremeos, *W. B. Anderson* (Pul); 8 mi. S. of Similkameen, *McCabe* 5901.

WASHINGTON. Okanogan: Muckamuck Lookout, *Thompson* 7014; Oroville; Big Craggy, *Thompson* 10858; Pogue Mt.; Alder Creek, near Twisp, *Edwards* 233; Brewster. Chelan: South Navarre Peak, *Kelly* 012; Bridge Creek; Lakeside; Malaga, *Whited* 2624; Nigger Creek, *Thompson* 8562; Entiat River, near Entiat, *Thompson* 11477; Berne, *Benson* 1583; Chumstick Mt.; Tumwater Canyon, *Thompson* 8270; base of Three Brothers; Blewett Pass, *Thompson* 6293, 8309; Colockum Creek, *Whited* 1. Kittitas: Table Mt., *Thompson* 9809; Ellensburg, *Piper* 2670. Douglas: betw. Coulee City and Waterville, *Spillman*; mouth of Moses Coulee, *St. John et al.* 2515; Sanderson, *do.* 9385; Badger Mt. Grant: Coulee City, *Piper* 3859; Grand Coulee, 13 mi. N. of Dry Falls, *Rogers* 451. Adams: 4 mi. S. of Lind, *Keck & Clausen* 3570.

The puberulence of the herbage, which gave the species its name, is highly variable from colony to colony without regard to geographical trend or elevation. Therefore, it is not the mark of natural subgroups within the species. The more puberulent forms may indicate a phylogenetic connection with *P. cinereus foliatus* to the southward, and the more glabrous forms are indicative of a relationship with *P. ovatus*, which occurs just over the crest of the Cascades to the west.

29. *PENSTEMON SUBSERRATUS* Penn.

Figs. 3 and 15

*Penstemon subserratus* Penn., Notulae Naturae 71:13, 1941. "Type, stony banks in coniferous forest, alt. 4000-4200 ft., on hill west of Gotchen Creek Ranger Station, Columbia National Forest, Yakima County, Washington, collected in flower and fruit July 31, 1931, by Francis W. Pennell, no. 15732; in Herb. Academy of Natural Sciences of Philadelphia." Isotype seen, CI.

Stems clustered, up to 20-30 in large plants, 3-8 dm. tall; herbage light green, below the inflorescence glabrous or finely puberulent or sparingly glandular-pubescent; leaves thin or rather firm, quite entire to remotely serrate-denticulate especially above, basal elliptic, tapering to base and apex, 5-20 cm. long including petiole once or twice as long as blade, 1-3 cm. wide, cauline linear-oblong to deltoid-lanceolate; thyrsus of 3-10 rather loose several-flowered  $\pm$  remote verticillasters, the peduncles usually appressed; calyx 3-5 mm. high, the lobes oblong to lance-ovate, acute or acuminate-tipped, the narrow scarious margin somewhat erose; corolla deep blue at limb and purple-blue at throat, 11-15(-18) mm. long, 3-5 mm. wide pressed, gradually amplify, the lips subequal; anther-sacs narrowly to broadly ovate, boat-shaped, not fully explanate, denticulate-ciliate, 0.8-1.1 mm. long; staminode reaching orifice, prominently golden bearded at the slightly dilated uncinat apex or sometimes for  $1/3$  its length.  $n = 16$ .

Dry open coniferous woods on the east flank of the Cascades, from Yakima County, Washington, to Mt. Hood, Oregon, at elevations from 700-1800 meters.

## Representative collections:

WASHINGTON. Yakima: Bald Mt., Nile Creek, *St. John* 7836; American River Camp, *Eastwood & Howell* 3035; Cliffdell, Naches River, *Keck* 5200; base of Cleman Mt., *Thompson* 14561; North Fork, Ahtanum Creek, *Bernath* 54F. Skamania: Mt. Adams, *Milburge* 1494; Little White Salmon River, N. W. of Chenoweth, *Suksdorf* 3649; Butterfly Lake, *Suksdorf* 3391. Klickitat: Satus Pass summit, *Keck* 5197; 5 mi. N. E. of Goldendale, *Keck & Clausen* 3500; Big White Salmon River, *Suksdorf* 3240; Falcon Valley.

OREGON. Hood River: 2 mi. S. of Cooper Spur, Mt. Hood, *Keck* 5196; Sherwood Forest Camp, Mt. Hood, *Keck* 5194.

It is more likely that *subserratus* is of amphiploid than of autopoloid origin. It could well have been derived from the two diploids, *pruinusosus* and *ovatus*, which flank it on two sides, although at present they are not cohabitant; but it might instead have arisen from a combination of *pruinusosus* and *cinereus foliatus*, which actually meet.

30. *PENSTEMON ALBERTINUS* Greene

Figs. 3 and 16

*Penstemon albertinus* Greene, Leaflets 1:167, 1906. "Sheep Mountain, Alberta, July, 1895, Mr. John Macoun, Geol. Surv. n. 11865, as in my herbarium." Type seen, ND; isotype, US. The type was collected in Waterton Lakes National Park, July 28-31, 1895, and consists of three pieces in flower, no 11865, and one in fruit, no. 11866.

*P. caelestinus* Pennell, Notulae Naturae 95:1, 1942. "Type, shale cliff, along Little Blackfoot River, nine miles northeast of Garrison, Powell County, Montana, collected in flower June 23, 1937, by Francis W. Pennell, no. 20536; in Herb. Academy

of Natural Sciences of Philadelphia." Isotype studied, CI. This more southern form Pennell would separate from the northern by the smaller, wider, lighter blue and less glandular corollas, the shorter less pointed sepals, and the lighter green foliage. All of these characters intergrade, as in Glacier National Park, Montana, near to the type locality of *albertinus*, where it is quite evident that all the variation is embraced within one interbreeding unit.

Stems clustered,  $\pm$  puberulent at least toward base or glabrous, rarely somewhat glandular throughout, 1.5-4 dm. tall; leaves bright green, thin or rather firm, mostly glabrous, obscurely but sharply serrate-denticulate or wholly entire, basal lanceolate to oval, 4-10 (-13) cm. long including the petiole once or twice as long as blade, 6-20 (-25) mm. wide, cauline lance-oblong; thyrsus narrowly paniculate, often leafy-bracted, of 4-8 rather loose many-flowered distinct verticillasters, the slender short peduncles of the lower cymules erect

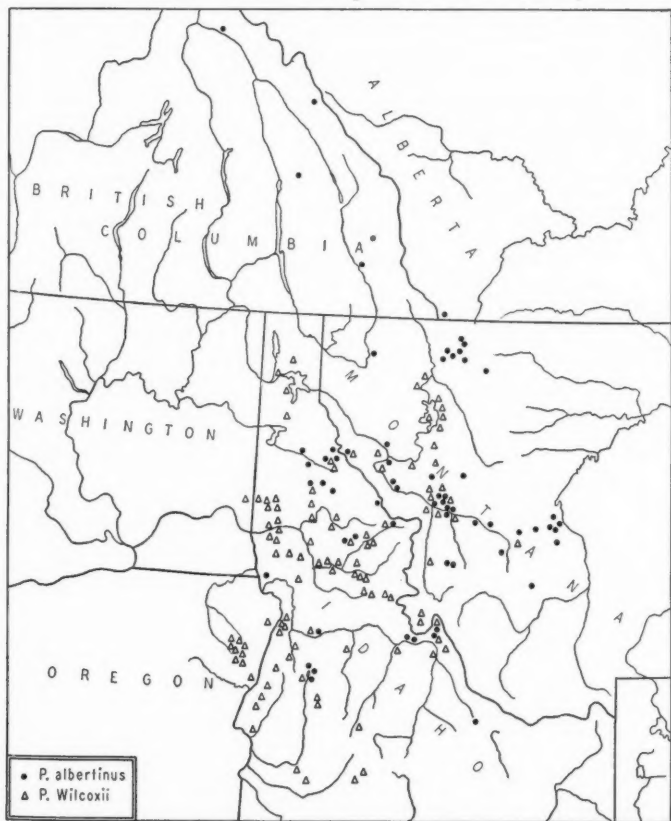


Fig. 16. Distribution of *Penstemon albertinus* and *P. Wilcoxii*.

or divergent; calyx 3.5 mm. high, the lobes lance-oblong, ovate, acute to acuminate, the narrow scarious margin subentire; corolla bright blue to blue-violet, 13-20 mm. long, 4-7 mm. wide pressed, moderately amplicate, the lower lip exceeding the upper; anther-sacs ovate, nearly explanate, denticulate-ciliate or glabrous, 0.65-0.8 mm. long; staminode reaching orifice, golden bearded at apex or for half its length, not dilated,  $\pm$  uncinat.  $n = 8$ .

Gravelly slopes or rocky ridges from eastern British Columbia and adjacent Alberta, southward to western Montana and central Idaho, at elevations from 1000-2200 (-2850) meters.

Representative collections:

BRITISH COLUMBIA. Kootenay: Kinbasket Lake, McCabe 6289 (C); Horseshief Creek, below Starbird Glacier, Ulke 1309; mts. E. of Wasa, McCabe 6423; Paradise Valley, W. B. Anderson 2038; Ft. Steele, Anderson 6244.

MONTANA: Glacier: Midvale (now Glacier Park), Umbach 214a, Glacier National Park: Many Glaciers, McCalla 4514; Garden Wall, Hitchcock 1938, Lincoln: Zeigler Mt., Snow (Pul). Sanders: Plains, Maguire 15633. Mineral: Saltese, Taylor 2018. Missoula: Missoula, Kirkwood 1736; Mt. Sentinel, Hitchcock 1634, 2325; Turah, Kirkwood 1275. Lewis and Clark: 11 mi. N. of Helena, Holker. Powell: Ryans Lake, Jones (Po). Silver Bow: high arid hills E. of Butte, Applegate 6405. Ravalli: Skalkaho Road (E. of Hamilton), Kirkwood 1784.

IDAHO. Shoshone: Lookout Pass, near Mullan, McCalla 4480; Cedar Mt., Moore 347; Mastodon Mt.; 7 mi. N. of Calder, Christ 10948; Little Lost Lake, Wilson 311; 3 mi. E. of Clarkia; divide betw. St. Joe and Clearwater rivers, Leiberg 1232. Nez Perce: brim of Salmon River Canyon, 16 mi. S. of Lake Waha, Weber 2201. Idaho: Lolo Pass, Davis 3700. Lemhi: North Fork of Salmon River, Davis 427; Shoup, Davis 13-35. Valley: McCall, Davis 195a-37 (CI, Pul, SU, toward Wilcoxii).

As indicated under *humilis*, *albertinus* intergrades to some extent with that species in Lemhi County, Idaho. The influence of this contact is apparent in the *albertinus* material from that whole southern region, which has a somewhat different cast than the material in western Montana or in the mountains to the north. The variation in *albertinus* is further increased by its many contacts with *Wilcoxii*, particularly in Idaho. It is probable that there is a relatively weak genetic barrier between the diploid form of *Wilcoxii* and this species, and this often makes herbarium determinations to species not wholly certain.

31. *PENSTEMON WILCOXII* Rydb.

Figs. 3 and 16

*Penstemon Wilcoxii* Rydb., Bull. Torr. Club 28:28, 1901. "Montana: Kalispell, 1900, E. V. Wilcox, 370 (type in United States National Herbarium) and 368." Type seen, and isotype NY.

*P. ovalis* var. *pinetorum* Piper in Piper & Beattie, Fl. Palouse Region 158, 1901. "The type is Piper No. 1662 from Cedar Mountain, [Latah Co., Idaho]." Type collected June 16, 1893, seen, Pul; isotypes C, CI, NY, Po, US, UW.

*P. pinetorum* Piper, Contr. U. S. Nat. Herb. 11:500, 1906.

*P. leptophyllus* Rydb., Fl. Rocky Mts. 773, 1066, 1917. "Type: Rush Creek, Washington Co., Ida. 1899, M. E. Jones 6493 (N.Y.)." Type seen, also isotypes Po, SU. This form has thin leaves larger than those of the type of *Wilcoxii*, the basal being truncate at base of blade, the cauline cordate-clasping and sharply dentate, and the inflorescence is more open and decompound. This is the only form in Oregon and in much of southwestern Idaho, yet the presence of intergrades over a wide area make it a poorly marked regional variant. It occurs rather frequently to northern



Idaho and even in Mineral and Missoula counties, Montana, where the thicker-leaved forms with condensed inflorescences are found growing with it over a large territory. As no geographical or ecological isolation appears to have been set up, and as complete recombinations are very common, there is no basis for maintaining this as a systematic unit. *Penstemon pinetorum* seems to be a recombination type between the *leptophyllus* form and typical *Wilcoxii*. It may have been further complicated by having accepted some genes from *attenuatus*.

Stems clustered, mostly glabrous or obscurely puberulent below, at times densely cinereous, 4-10 dm. tall; leaves pale to bright green, often rather thickish, usually glabrous, or sometimes hirtellous beneath, sharply but shallowly serrate-denticulate to subentire, basal lanceolate to ovate, 4-20 cm. long including the petiole as long as blade, up to 5 cm. wide, cauline lanceolate to broadly ovate; thyrsus contracted or expanded, of several to many nodes, either the distinct verticillasters rather congested and appressed, or their peduncles divaricate and much elongated (up to 10 cm.) and the ultimate cymules loosely decompound, in these cases the inflorescence prominently foliose-bracted; calyx 2.5-5.5 mm. high, the lobes lance-oblong to broadly ovate, acute to acuminate, the narrow scarious margin subentire; corolla bright blue to bluish purple, 13-23 mm. long, 4-8 mm. wide pressed, moderately to strongly ampliate, the lower lip much exceeding the upper; anther-sacs ovate,  $\pm$  explanate, glabrate, 0.75-1.0 mm. long; staminode slightly exserted, strongly yellow-bearded at undilated uncinat apex or for half its length.  $n = 8, 16$ .

Common in the mountains and valleys from Flathead County south to Ravalli County, Montana, and westward across north-central Idaho to the Blue Mountains of southeastern Washington and the Wallowa Mountains of Oregon, at elevations from 450-2250 meters.

Representative collections:

MONTANA. Flathead: Columbia Falls, R. S. Williams 893. Sanders: Dixon, *Hitchcock* 2872. Mineral: Camels Hump, *Applegate* 6433; Saltese. Missoula: Evaro; Bonner, *Hitchcock* 3663; Grant Creek, *Kirkwood* 1272; Mt. Sentinel, *Hitchcock* 1633, 2324. Powell: E. of Garrison, F. H. Rose 318. Ravalli: Hamilton, *Blankinship* 784; Alta, Jones.

IDAHO. Bonner: Clarks Fork, 5 mi. W. of Sandpoint, *Hitchcock* 2885. Shoshone: Avery, Moore 321. Clearwater: Headquarters; Greer, *Christ* 7455. Latah: Paradise Hills, Abrams 672. Nez Perce: Hatwai Creek, Sandberg et al. 172; Arrow Jct.; Culdesac. Lewis: Winchester, Constance & Rollins 1712; Craigmont, do. 1704. Idaho: Lochsa River at Pete King Creek, do. 1678, 1681; Kooskia, M. & R. P. Ownbey 2042; Coolwater Mt., Constance & Pennell 1982; Lowell; Red River R. S.; Selway Falls; Graves Point Lookout, Davis 2249; Little Salmon River, 12 mi. S. of Pollock, Constance 1853. Lemhi: S. of Gibbons Pass, Maguire 15651; Granite Mt., Blair. Valley: Payette Lake, near McCall, Constance 1949; Gold Fork Lookout, Thompson 13755. Washington: Spring Creek, Davis 2202. Ada: Boise, Clark 93. Elmore: Atlanta, MacFadden 15638 (CAS). Custer: Bear Creek, Macbride & Payson 3281.

WASHINGTON. Whitman. Kamiak Butte, 1877, Elmer (Pul). ? Co.: Blue Mts., July 1892, Hull (UW).

OREGON. Wallowa: Hurricane Canyon, Wallowa Mts., *Applegate* 6491; Snake River Canyon near mouth of Battle Creek, *Peck* 17604; Wallowa River, above Wallowa Lake, *Keck* 991. Baker: Cornucopia, Thompson 13366; Pine Creek, near Snake River, *Cusick* 1900.

The variability of this species, which extends even to the chromosome number, leaves it rather polymorphous, at present. Many additional chromo-



some counts are needed to determine the limits of the diploid and tetraploid races. It appears that the *leptophyllus* form may always be diploid, and that the more compact types may be tetraploid, but as yet it is impossible to circumscribe cytological units. Within the *leptophyllus* form, plants with densely pilose-puberulent stems are rather frequently found in north-central Idaho, but they are intermixed with plants that are more glabrous-stemmed. For this reason they have not been recognized as a subspecies, although they represent a notable minor variation.

The suggestion is made in the chart, figure 5, that *Wilcoxii* (the tetraploid form) may be an amphiploid derivative of *P. albertinus* and *P. pruinosus*, whose ranges do not overlap at present. Perhaps instead it could be an autopolyploid derivative of the 8-chromosome *Wilcoxii*. Both *albertinus* and *Wilcoxii* cover approximately the same area, and they appear to be aggressive colonizers and mixers, with rather weakly developed genetic barriers separating them from their neighbors and from each other.

### 32. *PENSTEMON ANGUINEUS* Eastw.

Figs. 4 and 17

*Penstemon Rattanii* var. *minor* A. Gray, Proc. Amer. Acad. 15:51, 1879. "Collected on Indian Creek, Del Norte County, California [*V. Rattan*]." This stream, which enters the Klamath River at Happy Camp, is wholly within Siskiyou County. One of the three isotype sheets at Stanford is labelled "Klamath River." Type, *Rattan* 44 (GH), seen.

*P. anguineus* Eastw., Bull. Torr. Club 32:208, 1905. "Collected near Shelley Creek on the Waldo-Crescent City road [Del Norte Co.], northwestern California, growing in rather wet places at the base of cliffs and rocks, in bloom June, 1903 [*Eastwood*]." Type seen, CAS.

*P. minor* Keck, Carnegie Inst. Wash. Publ. 520:295, 1940. This combination was made without bringing the types together, and I was interpreting Gray's variety to be the smaller-flowered more montane and interior form of the species, and *anguineus* a reduced form of *Rattanii*. The types of *minor* and *anguineus*, however, prove to be very similar, representing the more toothed-leaved, larger-flowered phase of the species, with less branched inflorescence than is commonly found on the interior peaks. The distinction between the two phases is not clear-cut either morphologically or ecologically, and so no named subdivisions of the species are proposed. The elements included in *anguineus* seem to be rather well differentiated from *Rattanii*, and have been recognized as specifically distinct under one name or another in all the floras of the present century that have covered their region.

Stems several, entirely glabrous below, 3-8 dm. tall; leaves bright green, thin, glabrous, serrate to finely denticulate or almost entire, basal oval to ovate, 5-15 cm. long including the petiole about as long as blade, 1-4 cm. wide, cauline oblong below, triangular-ovate and cordate-amplexicaul above, the largest to 9 cm. long and 5 cm. wide; thyrsus variable, of 3-10 dense strict and congested verticillasters or commonly more openly paniculate with lower divergent peduncles up to 10 cm. long; calyx 4-7 mm. high, the lobes lanceolate, entire; corolla deep lavender to blue-violet, with bright purple tube, 13-18 mm. long, 4-6 mm. wide pressed, rather abruptly ampliate, the short upper lip erect, the longer lower lip spreading, the palate sparingly bearded or sometimes glabrous; anther-sacs broadly ovate, dehiscent throughout or sometimes not

quite to the free end,  $\pm$  explanate, denticulate-ciliate or glabrous, 0.8-1.1 mm. long; staminode exerted, sparsely bearded for half its length or glabrous, the tip sometimes  $\pm$  dilated,  $n = 8$ .

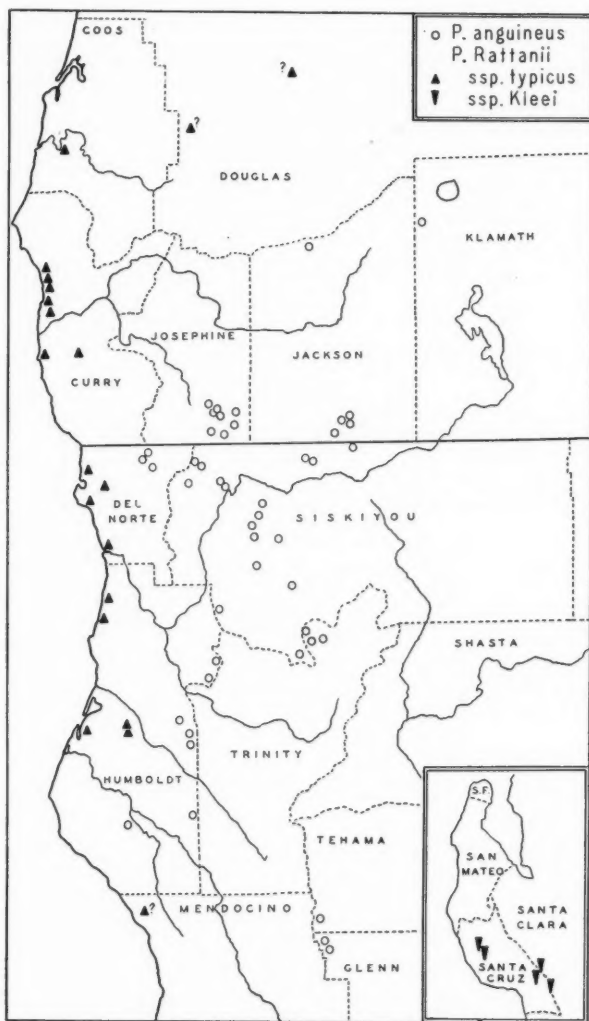


Fig. 17. Distribution of *Penstemon anguineus* and *P. Rattanii*.

Frequent in chaparral or openings of coniferous forest on mountainsides or ridges from Crater Lake National Park, Oregon, southwestward to Humboldt and Glenn counties, California, at elevations from 700-2250 meters.

Representative collections:

OREGON. Klamath: Redblanket Creek, near S.W. corner Crater Lake National Park, *Applegate 11302* (CI). Jackson: Camp Baker, 12 mi. N.W. of Trail, *Hitchcock & Martin 5009*; Mt. Ashland, *Keck 4845*; Long John Creek, *Wheeler 2966*. Josephine: Bolan Peak, *Thompson 12493*; 7 mi. W. of Bolan Lake, *M. & R. P. Ownbey 1794*; Mt. Grayback, *Thompson 12449*; Sturgiss Creek, Steve Peak region, *Applegate 6591*; Oregon Caves National Monument, *Applegate 11177, 11148, 11260, 11938*.

CALIFORNIA. Siskiyou: Hilt, *Rixford*; Marble Mt., *Chandler 1698*; Lily Pad Lake; Spirit Lake, *Howell 14901*; Shackleford Creek, *Butler 1761*; Salmon Summit, via Horn Creek Trail, *Kildale 5380*; Poker Flat, Del Norte County line, *Keck 4817*; Preston Peak, *Kildale 8677*; Caribou Gulch, *Howell 13544*. Del Norte: Monumental, *Parks & Tracy 11341*. Trinity: mouth of Union Creek, Salmon Mts., *Hall 8563*; Coffee Creek, at Onion Patch, *Hall 8531*; head of Rush Creek, *Yates 527*. Humboldt: Trinity Summit, *Tracy 10454, 15130*; Grouse Mt.; South Fork Mt., *Tracy 8918*; Red Peak, Lassecks Peaks, *Kildale 3820*; summit Grasshopper Peak, Humboldt Redwood Park, *Constance 905*. Tehama: Government Flat, *Eastwood & Howell 9799*. Glenn: summit Black Butte, *M. S. Baker*; Plaskett Meadows, *Howell 19237*.

The distributions of *P. anguineus*, *P. Rattanii*, and *P. ovatus* are very interesting ecologically. All are limited to the Humid Transition and Canadian zones of the Coast Ranges, a habitat in which very few species of *Penstemon* are found. These three, being diploid members of the same subsection, occupy complementary ranges: in the north is *ovatus*; in the south, *Rattanii* near the immediate coast, and *anguineus* adjacent to it but more interior-montane. Their distribution pattern is characteristic of that of closely related ecospecies.

Perhaps because they are both found in the Coast Ranges, *anguineus*, aside from its obvious affinity with *Rattanii*, is often thought to be closely related to *ovatus*. However, it differs in a number of respects from *ovatus* and is perhaps as closely connected phylogenetically with *Wilcoxii*, which is somewhat farther removed geographically and more interior, but which bears a similarity in the type of compound inflorescence, flower-shape, slightly dentate leaves, and tight-coated seeds.

### 33. PENSTEMON RATTANII A. Gray

Figs. 4 and 17

Stems often stout, several (1-50), entirely glabrous below, 3-12 dm. tall; leaves bright green, thin, glabrous, undulate-serrate to shallowly but acutely dentate, basal lanceolate to oval, 5-25 cm. long including the rather short stout petiole, 1-5 cm. wide, cauline oblong, sessile, becoming triangular-ovate and cordate-amplexicaul toward the inflorescence; thyrsus of 2-7 nodes, foliose below, the lower peduncles divergent, 1-4 cm. long, the cymules rather lax, few- to many-flowered; calyx 6-9 mm. high, accrescent, the lobes entire; corolla pale lavender to red-purple or violet-purple, the limb sometimes bluer, 24-30 mm. long, 8-10 mm. wide pressed, rather abruptly ampliate, the short upper lip  $\pm$  erect, the longer lower lip spreading, the palate sparingly to prominently bearded; anther-sacs broadly ovate, dehiscent throughout, nearly explanate,

glabrous, 1.25-1.4 mm. long; staminode well exerted, moderately long-bearded for half its length with yellowish hairs, the tip scarcely at all dilated.  $n = 8$ .

## KEY TO SUBSPECIES

- Calyx-lobes lanceolate, attenuate or acute, 7-9 mm. long, equaling or exceeding the ripe fruit. Mendocino Co., Calif., northward .....33a. *P. R. ssp. typicus*  
 Calyx-lobes ovate-oblong, obtuse, 6-7 mm. long, considerably exceeded by the ripe fruit. Santa Cruz Mts., Calif. ....13b. *P. R. ssp. Kleei*

33a. *Penstemon Rattanii* ssp. *typicus* nom. nov.

*Penstemon Rattanii* A. Gray, Proc. Amer. Acad. 15:50, 1879. "N. W. California, on Humboldt Ridge, Humboldt Co., 1878 and 1879, in a spruce forest, V. Rattan."  
 Type seen, GH.

Scattered colonies on grassy slopes and in the woods of the coastal mountains from Lane County, Oregon, to Mendocino County, California, at elevations from 10-1200 meters.

## Representative collections:

OREGON. Lane: Herman Peak, *Detling* 2972. Coos: 9 mi. S. W. of Coquille, *Keck & Clausen* 3435. Douglas (?): Mt. Scott, *Barber* 46, 53 (GH); coast mts. near Roseburg, June 1887, *Howell*. Josephine (?): Deer Creek Mts., July 5, 1887, *Howell*. Curry: 12 mi. S.E. of Port Orford, *Peck* 8645; 15 mi. N. of Gold Beach, *Thompson* 4468; 4 mi. N. E. of mouth of Rogue River, *Keck & Clausen* 3410; Cape Sebastian, *Eastwood & Howell* 3626; Snow Camp, 4000-4250 ft., *J. H. Thompson* 85 (SU).

CALIFORNIA. Del Norte: Douglas Park, on Smith River, *Thompson* 4522, 12920; Requa, *Duncan* 323. Humboldt: Big Lagoon, *Kildale* 2093; Kneeland Prairie, *Tracy* 2480, 9166; 2 mi. above Nellis Ranch, June 10, 1883, *Rattan* (SU). Mendocino: Signal Peak, June 1901, *Carruth* (CAS).

33b. *PENSTEMON RATTANII* ssp. *KLEEI* (Greene) Keck

*Penstemon Kleei* Greene, Bull. Torr. Club 10:127, 1883. "On the summit of Ben Lomond, the highest peak of the Santa Cruz Mountains, California. Collected by Mr. W. C. Klee in the month of June, 1883." A specimen at Gray Herbarium, collected by Klee on Ben Lomond in June, 1883, I take as the type. It is the only Klee specimen I have seen (there is none in Greene's herbarium), and was presumably sent by Greene to Asa Gray when the latter was interested in this entity.

*P. Rattanii* var. *Kleei* A. Gray, Syn. Fl. 2(1):441, 1886.

*P. Rattanii* ssp. *Kleei* Keck, Carnegie Inst. Wash. Publ. 520:295, 1940.

Local on mixed chaparral and coniferous slopes of the higher peaks of the Santa Cruz Mountains, California, at elevations from 400-1000 meters.

CALIFORNIA. Santa Clara: Mt. Madonna, south side at county line, *Keck* 4569. Santa Cruz: Loma Prieta, *Elmer* 5068; ridge at headwaters of Aptos Creek, by Sulphur Spring fence, *W. R. Dudley*; northern end of Ben Lomond Ridge, *Ferris* 2025; Ben Lomond, June 1889, *Brandegee*; near Santa Cruz, June 1888, *C. C. Parry* (ND).

This species is closely related to *anguineus*, and some intergradation may occur, but the common forms of each species are strikingly different in appearance. *Penstemon Rattanii* continues a trend away from the other species of subsection *Humiles*, which is well begun in *anguineus*.

34. *PENSTEMON WHIPPLEANUS* A. Gray

Fig. 18

*Penstemon glaucus* var. *stenosepalus* A. Gray, Proc. Amer. Acad. 6:70, 1882. "Rocky Mountains, about Pike's Peak, Clear Creek, &c., Dr. James in herb. Torr., Dr. Parry, 261, 262, and coll. 1862, distributed by Hall and Harbour, 399."

*P. Whippleanus* A. Gray, *ibid.* 73. "Arroyos in the Sandia Mountains, New Mexico, east of the Rio Grande, Dr. J. M. Bigelow, in Whipple's Expedition, Oct. 1853." An unusual form of the species in that the staminode is glabrous.

*P. arizonicus* Heller, Bull. Torr. Club 26:591, 1899. "Collected by Dr. D. T. MacDougal in shaded places on the inner slopes of the crater of San Francisco Mountain, near Flagstaff, Arizona, Aug. 8, 1898. The type specimen is deposited in the herbarium of the New York Botanical Garden." Type seen, *MacDougal 392*, labelled Humphrey's Peak of San Francisco Mt.; isotype US.

*P. stenosepalus* Howell, Fl. N. W. Amer. 1:514, 1901.

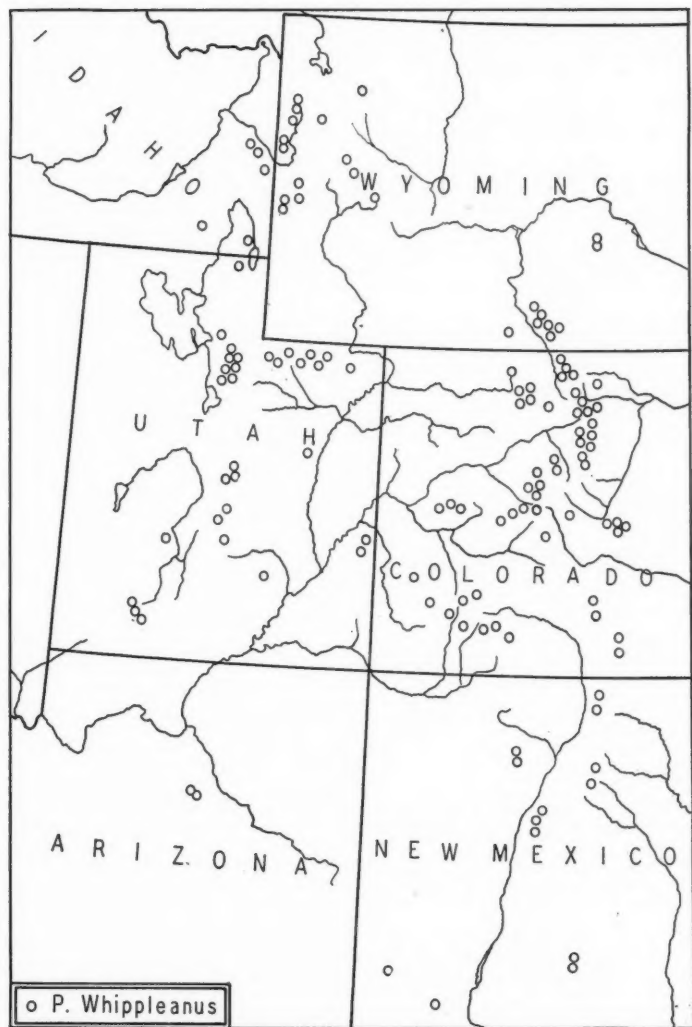
*P. puberulus* Woot. et Standl., Bull. Torr. Club 36:112, 1909. Not *P. puberulus* Jones, 1908. "Type collected on shady slopes at the Lookout Mine, Sierra Co., New Mexico, May 2, 1905, *Metcalf 1605*." Isotype, from Lookout Mine, 7500 ft. elev., S. end of Black Range, seen, NY. Stems puberulent instead of glabrous as usual, otherwise typical.

*P. Metcalfei* Woot. et Standl., *Torreya* 9:145, 1909. New name for *P. puberulus* W. et S.

*P. pallescens* Osterh., Bull. Torr. Club 57:559, 1930. "Collected on Rabbit Ears Pass, southwest of North Park, Colorado, Aug. 5, 1930. [Osterhout] No. 7280." Type seen, RM. The whitish-flowered form.

Stems often stout, forming clumps 1.5-6(-7.5) dm. tall; herbage deep green, glabrous below or occasionally the stems puberulent; leaves thin, entire or sometimes obscurely crenulate-toothed, basal elliptic-oblong to broadly ovate, acute, gradually or abruptly tapering to the slender petiole as long as or longer than blade, in all 4-10(-13) cm. long, 1-3 cm. wide, cauline oblong to lance-acuminate, the upper cordate-amplexicaul; thyrsus of 2-5 congested several-flowered verticillasters, foliose below, the upper ones confluent and dense, the lower more open, sometimes on elongated but appressed peduncles; calyx 7-11 mm. high, somewhat accrescent, the lobes broadly lanceolate to narrowly linear-lanceolate, attenuate, herbaceous throughout or nearly so, entire; corolla highly variable in color, ranging from deep dull purple or violet, through inky blue or greenish blue, to greenish white or creamy often tinged with purple, or wine purple or deep maroon to gray-purple or gray-violet or chocolate-purple, the color sometimes deeper within throat than without, 18-28 mm. long, 7-11 mm. wide pressed, abruptly ampliate,  $\pm$  gibbous, the lower lip much exceeding upper, both only slightly spreading, the palate villous; anther-sacs broadly ovate, becoming explanate, 1-1.4 mm. long; staminode well exerted, prominently tufted at the slightly dilated apex with a long yellow beard, or occasionally glabrous; capsule usually glandular-puberulent about apex.

On subalpine and alpine mountain sides from western and southern Wyoming, through most of the mountain chains to southwestern New Mexico and northern Arizona, at elevations from 2400-3700 meters.

Fig. 18. Distribution of *Penstemon Whippleanus*.

## Representative collections:

WYOMING. Teton: Hidden Falls, Grand Teton National Park, *Williams* 870; Two-gwo-tee Pass, *Williams* 943; Teton Pass, *Merrill & Wilcox* 945. Fremont: Surveyor Park, Wind River Mts., *E. B. & L. B. Payson* 2835. Sublette: Wyoming Range, W. of Merna, *do.* 2759. Lincoln: Salt River Range, E. of Smoot, *Payson & Armstrong* 3661. Carbon: Sierra Madre Mts., W. of Encampment, *Porter* 1339. Albany: Laramie Peak, *Nelson* 7551; 6 mi. W. of Centennial, *Keck* 912; summit Medicine Bow Mts., W. of Centennial, *Keck* 914.

COLORADO. Larimer: head of Poudre Canyon, *Keck* 883; The Bluffs, Spicer, *Gooding* 1526; Trail Ridge Road, Rocky Mountain National Park, *Rollins* 1020. Routt: Hahns Peak, *Gooding* 1697; Steamboat Springs. Clear Creek: Waldorf, *Clokey* 3863; Berthoud Pass. Summit: Argentine Pass, *Jones* 405. El Paso: Windy Point, Pikes Peak, *Bacigalupi* 774. Teller: betw. Florissant and Divide, *Keck* 857. Lake: Busk Ivanhoe Tunnel, *Keck* 830; Mt. Elbert: Westen Pass; Independence Pass. Delta: Ward Lake, Grand Mesa, *Martin* 350. Mesa: Mesa Lakes, Grand Mesa, *Keck* 808. Huerfano: Cucharas Creek, *Rollins* 1295. Mineral: Wolf Creek Pass, *Wolf* 3003. Ouray: Mt. Abram, *Pennell* 6202.

NEW MEXICO. Taos: Santa Barbara Canyon, Sangre de Cristo Range, *Nisbet* 25. San Miguel: Beulah; Hermit's Peak, 1883. *Snow*. Sandoval: Sandia Mts., *Nisbet* 23, 24. Bernalillo: Cienaga Canyon, *Castetter* 873. Otero: summit White Mountain Peak, July 22, 1931, *Huber*. Catron: Mogollon Mts., 9 mi. E. of Mogollon, *Wolf* 2721.

IDAHO. Bonneville: Caribou Mt. Bear Lake: Bloomington Lake, *Davis* 1612.

UTAH. Cache: Mt. Magog, *Maguire et al.* 14043. Summit: Gilbert Peak, *Maguire et al.* 14518; divide betw. E. Fork of Bear River and Blake's Fork, *Goodman & Hitchcock* 1520. Duchesne: Brown Duck Lake, *Graham* 6600. Uintah: Pine Island Lake, July 11, 1937, *Snow*. Davis: dugway overlooking Farmington Lake, *Hurd* 166. Salt Lake: Brighton, Big Cottonwood Canyon, *Keck* 751; Alta, *Keck* 744. Utah: Mt. Timpanogas, *Cottam* 1306. Carbon: Rock Creek, 10 mi. E. of Sunnyside, *Graham* 9590. San Pete: Skyline Drive betw. 12-Mile and Manti Canyon, *Plummer* 162. Grand: Burro Pass, *Maguire* 16288. Piute: Fish Creek, *Robinette* 120. Garfield: Crescent Creek, E. of Mt. Ellen, *Stanton & Mitchell* 9. Iron: 5 mi. N. of Cedar Breaks National Monument, *Hitchcock et al.* 4573. Kane: Navaho Lake, *M. S. Baßer* 8439.

ARIZONA. Coconino: San Francisco Peak, *Wolf* 3121. Mohave: Hualpai Mts., 6700 ft. elevation, *Stevens* (C).

While *Whippleanus* is sufficiently unlike the other members of its section from the Rocky Mountain region to have prompted *Pennell* (1920) to keep it in a monotypic section, it represents a parallel trend of development to that manifested in *anguineus* and *Rattanii* on the Pacific Coast, and through its similarity with those species it is accommodated naturally within the subsection *Humiles*. A principal unique variation it has developed is in the glandular pubescence of the ovary and capsule. This is found in all the collections thus far examined excepting those from the Sandia Mountains, New Mexico. In almost all other respects it shows a relationship with *Rattanii*, the similarity extending to the habit, the slightly crenate-dentate leaves, the shape of the calyx and corolla, the size and, to some extent, the color of the corolla, the exerted staminode, and the bearding of the palate and staminode.

The amazing variation in flower-color, which surpasses that in any other species of the genus, appears to be quite at random, and it is impossible to point out natural races based on this character.

## SUBSECTION 3. GRACILES

This group of species, with the exception of *P. oliganthus*, has been treated



in some detail by Pennell (1935). He provisionally applied the name *Graciles* to a section in which to include all the species here treated in the subsections *Proceri*, *Humiles*, and *Graciles*. As here restricted, the subsection *Graciles* includes just the eastern representatives of Pennell's section. It is not my purpose to review these species again here, but rather to show, through figure 5, some connections between them and the members of the preceding subsections. From an examination of figure 5 the reader will discover that fewer species are recognized in the eastern states by me than by Pennell. It is my belief that some reduction of units to subspecific rank or even to synonymy is needed in order to arrive at a species concept with some genetic basis in that territory, comparable to the one employed for the western units of the subsection *Spermunculus*. *Penstemon gracilis*, whose distribution was mapped by Pennell, is presented in brief here, and *P. oliganthus* is treated in the same manner as the preceding species in order to round out the account. These two species are considered to be phylogenetically about half way between the remainder of the *Graciles* and the members of the *Humiles*.

### 35. PENSTEMON GRACILIS Nutt.

Fig. 4

*Penstemon gracilis* Nutt., Gen. Amer. 2:52, 1818. "From the Arikarees to Fort Mandan, in depressed soils." Type seen, Ph.

*Chelone gracilis* Spreng., Syst. Veg. 2:813, 1825.

*Penstemon glaucus* R. Grah., Edinb. N. Phil. Jour. 7:348, 1829. "Seeds from Mr. Drummond after his return from the second journey to British North America." A photograph of the type, a garden plant in Royal Botanic Garden, Edinburgh, seen, C.I. Lindley published a plate of the species in the same year in the Botanical Register. Photographs of two sheets in the Lindley Herbarium, including *Drummond* 235, seen, C.Po. Drummond's collections were doubtless made in Saskatchewan. The typical form.

*P. Digitalis* var. *glaucus* Trautv., Bull. Acad. St. Petersb. 5:345, 1839.

*P. Digitalis* var. *gracilis* Trautv., loc. cit.

*P. pubescens* var. *gracilis* A. Gray, Proc. Amer. Acad. 6:69, 1862.

Stems slender, few, glabrate to puberulent below, 2-6 dm. tall; rosette developed; leaves light green, thin, glabrous or nearly so, regularly and finely serrate-denticulate or subentire, basal oblanceolate to oval, obtuse, 3-6 cm. long including the often winged petiole usually shorter than blade, 6-15(-23) mm. wide, cauline linear-lanceolate, attenuate, somewhat clasping; thyrsus glandular-pubescent, narrow but not congested nor strict,  $\pm$  secund, of 3-6 few-flowered verticillasters, the lower on rather long but appressed peduncles; calyx 4-6.5 mm. high, the lobes broadly lanceolate to ovate, acuminate, the narrowly scarious margin entire; corolla pale lilac or pale violet, whitish within, 15-23 mm. long, 5-8 mm. wide pressed,  $\pm$  ampliate, strongly bilabiate, the reflexed lower lip considerably exceeding the straight upper one, the strongly plicate palate white-villous; anther-sacs opposite, oblong, opening by slits almost to the free tip, not at all explanate, denticulate-ciliolate, 1.1-1.5 mm. long; staminate short-exserted, rather dilated, straight, densely bearded with long yellow hairs for most of its length; seeds very numerous, 0.6-0.7 mm. long, the testa corky at base, otherwise tight-fitting.  $n = 8$ .

Sandy prairies from Peace River in northern Alberta and adjacent British Columbia southeastward to Wisconsin, Nebraska, and northeastern New Mexico, ascending the Rocky Mountains to an elevation of 2600 meters.

The distribution of this species is well cited and mapped by Pennell (1935). The only notable range extension I would add is the occurrence of the species in western Montana, as at Bozeman, Gallatin Co., *Blankinship* 785 (Po) and Dixon, Sanders Co., May 31, 1937, *Brome* (Pul).

As previously mentioned, there appear to be connections between this species and *virens*, *aridus*, and *radicosus* of the *Humiles*, but these species may all have been independent for a very long period. The seeds and the anthers of *gracilis* are abruptly different from those found in the *Humiles*, but some of the more eastern species of *Graciles* trend toward the *Humiles* pattern again in these features.

### 36. *PENSTEMON OLIGANTHUS* Woot. et Standl.

Figs. 4 and 14

*Penstemon oliganthus* Woot. et Standl., Contr. U. S. Nat. Herb. 16:172, (Feb.12) 1913. "Type in the U. S. National Herbarium, no. 259061, collected in the mountains west of Grants Station [Valencia Co., New Mexico], August 1, 1892, by E. O. Wootton." Type seen.

*P. Griffithii* A. Nels., Bot. Gaz. 56:70, (July 16) 1913. "Collected by Alfred A. Griffin in the Rio Grande Valley [Colorado], on moist east slopes, at 8,200 feet, July 28, 1912, no. 145." The type, from Wagonwheel Gap, Mineral County, seen. RM.

Habit of *P. gracilis*; stems slender, puberulent at base, puberulent or glabrous up to inflorescence, 2.5 dm. tall; rosette well developed; leaves green, thin, glabrous or puberulent, entire, basal lanceolate to elliptic, acute or obtuse, 2.5-13 cm. long including the slender petiole often as long as blade, 6-15 mm. wide, cauline narrowly lanceolate to linear-attenuate, sessile by a narrow base; thyrsus and calyx like *gracilis*; corolla purplish blue, (14-)18-24 mm. long, 3.5-9 mm. wide pressed, nearly tubular to abruptly ampliate, strongly bilabiate, the reflexed upper lip much exceeded by the projecting lower one, the strongly plicate palate usually very densely bearded with white or yellowish hairs; anther-sacs oblong, opening throughout, not at all explanate, denticulate-ciliate, 0.9-1.6 mm. long; staminode reaching orifice, not dilated,  $\pm$  falcate, densely yellow- or golden-bearded for most of its length.  $n = 8$ .

In meadows, or more often on open slopes among pines, oak chaparral, or sagebrush, from Park County, Colorado, southward to Catron County, New Mexico, at elevations from 2100-3050 meters.

#### Representative collections:

COLORADO. Chaffee: base of Mt. Princeton, *Sheldon* 554; Salida, *Pennell* 6310. Fremont: N. of Lock Mt., *Rollins* 1228. Saguache: Alder, *Ramaley & Johnson* 14967. Rio Grande: South Fork, *McVaugh* 5809.

NEW MEXICO. Colfax: Therna, *Whitehouse* 7803; Eagles Nest Lake, head of Cimmaron Canyon, *Nisbet* 19. Taos: Red River below Questa; 15 mi. E. of Taos, *Rollins & Chambers* 2413; Tres Ritas Canyon, *Nisbet* 21. Sandoval: Sandia Rim, *Castetter*

377. Bernalillo: Cienaga Canyon, Sandia Mts., Castetter 874. Valencia: near Laguna Largo, Mt. Taylor, Castetter 1625. Socorro: Water Canyon, Magdalena Mts., Benson 324; Hop Canyon, do., Nisbet 758; Mount Withington, Monica Canyon, Nisbet 760. Catron: 18 mi. N.E. of Mogollon, Hitchcock et al. 4440.

ARIZONA. Apache: 12 mi. E. of Big Lake, Hitchcock et al. 4488; 5 mi. N.E. of Cooley's Ranch, Ferris 1280; 15 mi. E. of McNary, Peebles & Smith 12562; Beaverhead Lodge, White Mts., Kearney & Peebles 12432; summit White Mts. (Springville-Fort Apache road), Eggleston 15762.

This species exhibits variation in both the shape and bearding of its flower. In Colorado its corolla is bearded half way down the throat with rusty golden hairs, while in New Mexico and Arizona it is bearded only about the orifice, and with pale yellow or white hairs. However, in the White Mountains of Arizona one collection, otherwise typical for the region, is observed to be bearded well down the throat, and so this character does not mark geographical units worthy of naming.

*Penstemon oliganthus* is not strongly separated from *gracilis*, and it may be only a well marked ecotype of that. In general, however, a number of characters separate it, including the entire leaves, more puberulent herbage, slenderer and longer petioles, narrower cauline leaves, deeper corolla color, and a more densely bearded throat.

#### SUBSECTION 4. TUBAEFLORI, AND SUBSECTION 5. MULTIFLORI

Pennell (1935) provisionally treated these groups as sections. Both are monotypic, the *Tubaeflori* being typified by *P. tubaeiflorus* Nutt., of the Mississippi Valley, a species with corolla glandular-puberulent within and adapted for pollination by moths, and the *Multiflora* by *P. multiflorus* (Benth.) Small, a species of Georgia and Florida that is notable for the development of saccate anthers.

#### SUBSECTION 6. HARBOURIANI

This is another monotypic subsection. It is composed of *P. Harbourii* A. Gray, an alpine mat occurring on high peaks almost throughout the length of Colorado. As indicated in figure 5, this subsection is believed to have stemmed from a common line with the *Graciles*. Features of its strongly plicated corolla suggest this connection. However, a number of distinctive characters, including the fibrous root system, habit, abbreviated leafy inflorescence, slimy-pubescent calyx, and retrorsely canescent herbage, amply separate it from the *Graciles*. The type of pubescence of the inflorescence and herbage and its broad anthers place it in an intermediate position between other members of *Spermunculus* and species of the section *Aurator* and perhaps also *Ericopsis*. *Penstemon Harbourii* is not thought to be a direct link between these sections, but a side development whose direct predecessors have probably been lost from the present-day flora.

#### SUBSECTIONS 7. GAIRDNERANI, 8. DEUSTI, AND 9. ARENARI

These three subsections were treated in an earlier paper (Keck, 1940). The two species of *Gairdnerani* (*P. seorsus* (A. Nels.) Keck and *P. Gairdneri*

Hook.), the three of *Deusti* (*P. deustus* Dougl. ex Lindl., *P. variabilis* Suksd., and *P. Tracyi* Keck), and the two of *Arenarii* (*P. arenarius* Greene and *P. albomarginatus* Jones) complete the list of members of the section *Spermunculus* as now known.

## REFERENCES

- CLAUSEN, J. 1933—Cytological evidence for the hybrid origin of *Penstemon neotericus* Keck. *Hereditas* 18:65-76.
- DAVID D. KECK, AND WILLIAM M. HIESEY. 1940—Experimental studies on the nature of species. I. Effect of varied environments on western North American plants. Carnegie Inst. Wash. Publ. No. 520. 452 pp.
- ——— In press—Experimental studies on the nature of species. II. Plant evolution through amphiploidy and autopolyploidy, with examples from the Madiinae. Carnegie Inst. Wash. Publ. No. 564.
- DAYTON, WILLIAM A. 1926—Notes on the type locality of *Penstemon micranthus* Nutt. *Proc. Biol. Soc. Wash.* 39:11-13, map.
- KECK, DAVID D. 1940—Studies in *Penstemon* VII. The subsections *Gairdneriani*, *Deusti*, and *Arenarii* of the *Graciles*, and miscellaneous new species. *Amer. Midl. Nat.* 23:594-616.
- LA COUR, L. 1931—Improvements in everyday technique in plant cytology. *Jour. Roy. Microscop. Soc.* 51:119-126.
- PENNELL, FRANCIS W. 1920—Scrophulariaceae of the central Rocky Mountain states. *Contr. U. S. Nat. Herb.* 20:313-381.
- 1935—The Scrophulariaceae of eastern temperate North America. *Acad. Nat. Sci. Philad. Monog.* 1. 650 pp.
- SAKAI, K. 1934—Studies on the chromosome number in alpine-plants. I. *Jap. Jour. Genetics* 9:226-230.
- WINGE, Ö. 1925—Contributions to the knowledge of chromosome numbers in plants. *La Cellule* 35:305-324.

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## A Revision of Agastache

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Agastache occurs throughout most of the United States and extends to Central Mexico and into Canada. One species also occurs in Japan, Manchuria and Eastern China. The genus comprises two well defined sections, each of which has a separate geographical area. The first, *Chiastandra*, is northerly in distribution and occupies the mesic areas of the Mississippi drainage and the Pacific slope. It recurs in Eastern Asia. Its species are eight in number. They are relatively well defined and present but little intraspecific variation in comparison with the species of the second section. That section, *Brittonastrum*, is found in the arid regions of the Southwestern United States and Mexico. Its twelve species, as delimited here, not only present a greater range of difference than those of *Chiastandra*, they are also more variable and the extremes of one are often similar to the extremes of another. Hence they are difficult to delimit.

The genetic relationships of the genus appear to be complex. For example, the two sections meet in the Southern Rocky Mountains of Colorado. *Chiastandra* is represented there by *A. urticifolia* and *Brittonastrum* by *A. pallidiflora*. It is noteworthy that, although these species belong to different sections, as judged by the conformation of the stamens, (the most reliable sectional criterion), they are otherwise so similar morphologically as to be readily confused. At the same time they are the most variable species in the genus.

In view of the nature of variation, it is not surprising that the nomenclature of the genus is extremely confused and involved. This confusion has been compounded by uncertainty on the part of some authors, especially the earlier ones, as to the generic limits and content, despite the fact that the genus as now constituted is homogeneous and well defined. Hence, at one time or another, we find that species have been referred not only to *Agastache*, but also to the genera *Cedronella*, *Dracocephalum* (Moldavica), *Garadoquia* (Satureja), *Hyssopus*, *Lophanthus* and *Stachys*, all now generally recognized. In addition, the section *Brittonastrum* has been accorded generic rank.

It is a pleasant obligation for the writers to acknowledge indebtedness to the curators of the following herbaria for the generous loan of material: the U. S. National Herbarium, the New York Botanical Garden, the University of California at Berkeley, the Gray Herbarium, the Academy of Natural Sciences of Philadelphia, the University of Wisconsin, the University of Michigan, the Dudley Herbarium of Stanford University, the University of West Virginia, the University of Washington, the University of Idaho, the San Diego Society of Natural History and the Rancho Santa Ana Botanic Garden.

*Agastache* Clayton ex Gronov., Fl. Virginica 88. 1762. Type species, *A. scopulariaefolia*.

Perennial herbs with simple or branched stems which arise from creeping rhizomes or a woody caudex, their internodes often elongate, especially the

upper; leaf blades prevailingly ovate or deltoid-ovate and crenate-serrate, or less often lanceolate or linear, and entire, petiolate or nearly sessile, variously pubescent; flowers in dense sessile verticils which are usually disposed in continuous or interrupted cylindrical or tapering spikes, or frequently in loose pedunculate verticils, of which the branches are visible, either spicate or disposed in narrow panicles, the subtending bracts frequently conspicuous; calyces turbinate or tubular in flower, 15-veined or more, 5-dentate, the teeth equal, or the three posterior more or less united, deltoid or ovate to subulate, often thin and membranous and usually whitish or colored, the tubes either green or tinged with blue or rose; corollas rose, violet or white, exannulate, the orifice oblique; stamens 4, usually seated near the middle of the tube or above, paired, the pairs unequal, usually exserted beyond the upper lip, either parallel, or the lower pair ascending under the upper lip and the posterior pair thrust down and exserted between them; nutlets rounded-truncate and generally hispidulous at the apex.

## KEY TO THE SECTIONS

Anterior (lower) stamens ascending under the upper lip, the posterior (upper) thrust down and exserted between them; plants of the United States, (exclusive of Arizona, New Mexico and Texas, except the northeastern portion), and southeastern Asia. ....

1. *Chiastandra*.

Stamens parallel, both pairs thrust similarly out from the tube; plants of Arizona, New Mexico, southern Colorado and Texas, ranging southward to central Mexico. ....

2. *Brittonastrum*.

## I. Sect. CHIASTANDRA

*Lophanthus* sect. *Chiastandra* Benth., Lab. Gen. et Sp. 462. 1834.—*Vleckia* Raf., Med. Repos., N. York 5:352. 1808. Type species, *V. nepetoides*.—*Cedronella* (in part) Benth., Lab. Gen. et Sp. 502. 1834.—*Lophanthus* Benth., Bot. Reg. sub t. 1282. 1829 (in part).—*Agastache* sect. *Amblyodonta* Briq. in Engler u. Prantl, Nat. Pflanzenf. 4:3a:234. 1896, based upon *A. nepetoides*.—*Agastache* sect. *Oxydonta* Briq. l. c., based upon *A. scrophulariaefolia*, *A. Foeniculum*, *A. urticifolia* and *A. rugosa*. Being the eldest name and well represented in herbaria, *A. nepetoides* is proposed as the standard species of the section.

Inflorescence usually evenly spicate, dense, but interrupted-spicate in some forms of *A. Foeniculum*; lateral lobes of corolla about equally joined, the tubes generally hirtellous within; anterior stamens ascending under the upper lip, the posterior pair thrust down and exserted between them. Plants predominantly of the northern United States, ranging to North Carolina in the Appalachian Mountains, to Colorado and Utah in the Rocky Mountains, and to southern California in the San Bernadino Mountains. One species is Asiatic.

The section *Chiastandra* forms a closely knit group of which *A. Foeniculum* and *A. nepetoides* are the most readily recognized and defined. These species are sympatric to each other and to *A. scrophulariaefolia* and there appears little doubt of their specificity. The remaining species, *A. scrophulariaefolia*, *A. rugosa*, *A. urticifolia*, *A. occidentalis*, *A. parvifolia* and *A. Cusickii*, although similar, are morphologically distinguishable; but their areas are allopatric. (Although the ranges of the two latter are included by that of *A. urticifolia*, the three entities do not occur together so far as known.) Hence they may or

may not be conspecific. But because the morphological evidence alone is inconclusive, and because they have already been named, it has seemed preferable to maintain them as species, rather than to make an equivalent number of new combinations.

Of this group *A. scrophulariaefolia* and *A. urticifolia* are perhaps the most clearly defined, not only by the habit of the leaves but also by the nature of the calyces. Yet, in both characteristics they frequently approach each other and are clearly eastern and western homologs. Although the typical pubescence of each is different, both embrace pubescence forms which are similar. These atypical pubescence forms of both species are similar to the typical and fairly uniform pubescence of *A. rugosa* of China and Japan, a species very much like *A. scrophulariaefolia* var. *mollis* from which it differs chiefly in leaf habit.

*A. occidentalis* appears to be more or less intermediate between *A. Foeniculum* and *A. urticifolia*, to both of which it is allopatric. Its intermediate morphology strongly suggests that it may be an amphiploid.

*A. parvifolia* and *A. Cusickii* are inadequately known and are least well defined and both may prove to be conspecific with *A. urticifolia*. But as represented in herbaria at present, they are recognizable and show no intergradation with that species. *A. Cusickii* is known only from the type locality.

## KEY TO THE SPECIES

- A. Corolla tubes mostly less than 7.5 mm. long; calyx teeth deltoid or ovate, mostly 1-2 mm. long; mature spikes usually 1.5-2 cm. in diameter. Plants of the plains states of Canada and the United States, ranging eastward to the Atlantic Coast.
  - B. Under surface of leaves minutely and densely tomentellous, feltlike, the upper quite glabrous; calyces hirtellous throughout, at least the teeth violet, rarely white ..... 4. *A. Foeniculum*
  - BB. Under surface of leaves glabrous, or if pubescent, not feltlike, the individual hairs evident; calyces glabrous, the teeth green, whitish or rose.
    - c. Calyx teeth ovate, obtuse, firm and more opaque than the tubes; corollas yellowish; spikes mostly 1.5 cm. in diameter or less ..... 1. *A. nepetoides*
    - cc. Calyx teeth deltoid and acute, rather than ovate and obtuse, thinner than the tubes, whitish or rose; corolla rose or purplish; spikes mostly 1.5-2 cm. in diameter ..... 2. *A. scrophulariaefolia*
- AA. Corolla tubes mostly more than 8 mm. long (7-8 mm., rarely 10 mm. in *A. rugosa*); calyx teeth deltoid-lanceolate, 2.5-7 mm. long, or deltoid and 1.5-4 mm. long; mature spikes mostly 2-3 cm. in diameter. Plants of the Rocky mountains and Pacific Coast, and southeastern Asia.
  - B. Under surfaces of the leaves densely pubescent with minute hairs which form a feltlike covering similar to that of *A. Foeniculum*, the individual hairs obscure, even when viewed with a lens.
    - c. Leaf blades prevailing 2-4 cm. broad, their margins narrowly inrolled; calyces glabrous or thinly hirtellous, the upper lips incised 2-4 mm., the teeth deltoid, 2-4 mm. long. Plants of Washington ..... 5. *A. occidentalis*
    - cc. Leaf blades prevailing 1-1.5 cm. broad, their margins plane; calyces densely hirtellous, the upper lips incised 4-7 mm., the teeth lanceolate, 4-7 mm. long. Plants of the lava region of northeastern California ..... 7. *A. parvifolia*
  - BB. Under surfaces of the leaves glabrous, or if pubescent, the individual hairs evident under a lens, hardly forming a feltlike covering, the pubescent forms confined to California and adjacent Nevada and southern Oregon, or Asiatic.



- c. Leaf blades prevailinglly 1-1.5 cm. broad; calyx teeth deltoid-lanceolate, 4.5-5.5 mm. long; plants apparently about 50 cm. tall, known only from Stein's Mts. of southeastern Oregon .....8. *A. Cusickii*
- cc. Leaf blades prevailinglly 3-4 cm. broad; plants commonly a meter tall or more.
- D. Calyx teeth narrowly deltoid or deltoid-lanceolate, 3.5 mm. long, rarely 2.5 mm.; plants of the western United States .....6. *A. urticifolia*
- DD. Calyx teeth narrowly deltoid, 1.5-2 mm. long, rarely 3 mm.; plants of eastern Asia .....3. *A. rugosa*

1. *A. NEPETOIDES* Kuntze, Rev. Gen. 511. 1891.

*Hyssopus nepetoides* L., Sp. 569. 1753. The standard may be taken as the specimen of the *Hort. Cliff.* (British Museum) labelled with his name (Epling, Journ. Bot. (Lond.) 1929 p. 8). —*Vleckia nepetoides* Raf., Med. Repos. N. York 5:352. 1808. —*Lophanthus nepetoides* Benth., Bot. Reg. sub. t. 1282. 1829.

Stems commonly a meter tall or more, branching in the upper parts, pubescent with fine curved hairs, at least in the inflorescence, glabrous below; leaf blades broadly or narrowly ovate, the median mostly 8-15 cm. long, 3.5-7 cm. broad, rather abruptly acuminate, rounded at the base or somewhat cordate, rather coarsely serrate, the upper surfaces glabrate, the lower pubescent with fine curved hairs; petioles of median leaves mostly 2-5 cm long; spikes cylindrical, 5-10 cm., rarely 15 cm. long, usually about 12-15 mm. in diameter at maturity, compact and continuous, or the lower verticils sometimes approximate; bracts mostly ovate, glabrate or minutely hirtellous, usually ciliate, green and subfoliar, usually exceeding the calyces; calyx tubes 3-4.5 mm. long, the teeth about 1 mm. long, tending to ovate, usually obtuse, green and more opaque than the tubes, their veins prominent; corollas yellowish, the tubes 5-6.5 mm. long; lower stamens 3-4.5 mm. long, the upper about 4-5 mm. long; nutlets about 1.5 mm. long.

*Distribution* (Map 1).—Occurs abundantly from New York, New Jersey, Delaware and Virginia westward to Wisconsin, Iowa, Nebraska and Kansas and is less frequently found in Vermont, Massachusetts, Connecticut, Quebec, Ontario, Tennessee, Arkansas, and Oklahoma. It has also been reported from northern Georgia (*Chapman*) and South Carolina (*Rugel*).

2. *A. SCROPHULARIAEFOLIA* Kuntze, Rev. Gen. 511. 1891.

*Hyssopus scrophulariaefolius* Willd., Sp. Pl. 3:48. 1800. The type was a garden plant and not improbably the specimen now in the Willdenow Herbarium (Berlin).—*H. catariaefolius* Hort. Par. ex Benth., Lab. 463. 1834.—*Vleckia scrophulariaefolia* Raf., Fl. Tellur. 3:89. 1836.—*Lophanthus scrophulariaefolius* Benth. in Bot. Reg. sub t. 1282. 1829.—*L. s.* var. *mollis* Fern., Rhodora 1:220. 1899; type collected by M. A. Day at Dorset, Vt. (Gray Herb.).—*Agastache scrophulariaefolia* var. *mollis* Heller, Muhlenbergia 1:4. 1900.

Stems commonly a meter tall or more, branching in the upper parts, variable in pubescence, often red; leaf blades broadly or narrowly ovate, the median mostly 8-15 cm. long, 3.5-7 cm. broad, generally acuminate above the middle, rounded at the base or somewhat cordate in the broader forms, coarsely serrate, both surfaces variably pubescent or nearly glabrous; median petioles mostly 2-5 cm. long; spikes cylindrical, but tapering somewhat, 5-50 cm. long, 1.5-2 cm. in diameter at maturity, compact and continuous or the lower verticils separate; bracts mostly ovate, abruptly acuminate or even caudate, glab-

rous, tending to membranous and often colored at the margins, about as long as the calyces; calyces glabrous, the tubes 3.5 mm. long at anthesis, increasing somewhat at maturity, the mature teeth about 2 mm. long, tending to narrowly deltoid, acute, thinner than the tubes and whitish or rose, but the veins prominent; corollas rose or purple, the tubes 6-7 mm. long; nutlets about 1.5 mm. long.

The pubescence of *A. scrophulariaefolius* is of two types, between which many intermediates occur. The first type, which the one more commonly collected, consists of relatively coarse jointed trichomes which appear on the stems, often only on the angles, and on both surfaces of the leaves. On the lower surfaces they occur only on the veins. These trichomes are usually recognizable and relatively long. Both surfaces of the leaf may be equally hirsute, or the lower may be relatively glabrous. A plant with strongly hirsute leaves may have glabrate stems. The second, known as var. *mollis* (Fern.) Heller, and less frequently collected, consists of hairs which are small and curled. In appearance they recall those of *A. rugosa* and the pubescent form of *A. urticifolia*. The upper surfaces of this form may be glabrate or both may be equally pubescent. As in the first type, there is no correlation between abundance of hairs on the leaves and on the stems. In some plants the upper leaf surfaces may be sprinkled with hairs of the first type, but the lower pubescent with hairs of the second. In still other plants the leaves may be softly pubescent, at least on the lower surfaces, but the hairs of the stems may vary from one type to the other. It is obvious that the factors which control the inheritance of these pubescence forms are complex, and that "var. *mollis*," at best, does no more than designate only one of several possible combinations of characters.

Both forms seemingly occur together over most of the specific area. However, there may be some segregation, for it appears that "var. *mollis*" is most frequently collected in Illinois and Iowa and in Massachusetts and Connecticut, whereas only the typical form is known from the southern Appalachians in North Carolina.

*Distribution* (Map 1.)—Occurs most abundantly from New York and New Jersey southward to North Carolina and westward to Illinois, Iowa and Wisconsin. It is less frequently found in Connecticut, New Hampshire, Vermont, Massachusetts, Kansas, Nebraska, South Dakota and Minnesota. *A. scrophulariaefolia* var. *mollis* Heller has been found in typical form in Massachusetts (Oak Island), New Jersey (Groveville), Virginia (Luray, Stripling Springs), Kentucky (Lexington), Missouri (Lees Summit), Illinois (Port Byron, Naperville, Athens), Iowa (Dakota City, Grinnell, Iowa City, Mason City) and Wisconsin (Milwaukee).

### 3. *A. RUGOSA* Kuntze, Rev. Gen. 2:511. 1891.

*Lophanthus rugosus* Fisch. et Meyer, Ind. Sem. Hort. Petrop. 1:31. 1835. The type was a garden specimen and is presumably at Leningrad.—*L. formosanus* Hayata, Ic. Pl. Formos. 8:87. 1919. (fide Kudo).—*Agastache rugosa* var. *hypoleuca* Kudo, Jour. Coll. Sci. Imp. Univ. Tokyo 43:8:16. 1921.—*A. rugosa* forma *lanceolata* Kudo, l.c.—*Cedronella japonica* Hassk., Acta Soc. Sci. Indo-Neerland. 1:7:37. 1856.

Stems commonly a meter tall, or more, branching in the upper part, glabrous or finely pubescent; leaf blades ovate, the median mostly 6-8 cm. long, less often 10 cm. long or more, 4-6 cm. broad, generally acuminate above the middle, mostly cordate at the base, but sometimes rounded, coarsely serrate,

the upper surfaces thinly and minutely hirtellous, or glabrate, the lower pubescent with curled hairs, sometimes chiefly along the veins; median petioles mostly 2-3 cm. long, rarely 5 cm., slender; spikes cylindrical, but tapering somewhat, mostly 5-10 cm. long, mostly 1.5-2 cm. in diameter at maturity, compact and continuous or the lower verticils separate; bracts lanceolate, thin and inconspicuous; calyces hirtellous throughout with minute hairs, or glabrate, tending to membranous and often colored rose or violet, or white at the tips, the tubes 4-5 mm. long at anthesis, increasing somewhat at maturity, the mature teeth 1.5-2.5 mm. long, rarely 3 mm., mostly narrowly deltoid, acute, membranous and sometimes thinner than the tubes, the veins prominent; corollas violet or pallid or rose, the tubes mostly 7-8 mm. long, infrequently 10 mm.; nutlets 2 mm. long.

Similar to *A. scrophulariaefolia* var. *mollis*, differing chiefly in the more ovate and usually cordate leaves, which are more acuminate, with a longer entire acumens, and often more coarsely toothed.

*Distribution* (Map 1).—CHINA. Hupeh. Hsiowutaishan, 1600 m., *Li* 10887. Without place, IX. 1929, *Li* 11195. Without place, *Wilson* 2508. Without place, *Henry* 4779. Hsien Shan Hsien, IX-X. 1926, *Chen* 15192.—Szechwan. Omei Hsien, Mt. Omei, 5000-5500 ft., 16. VIII. 1928, *Fang* 3067, *Kuan Hsien*, 3000-3600 ft., 8. VII. 1928, *Fang* 2086. Without place, *Henry* 7228. Tchen-Keon-lin, *Abbe Farges*.—Anhwei. Wa Yuan, 2. IX. 1925, *Ching* 8984. Chiuhwashan, 700-800 m., 27. VIII. 1933, *Sun* 1360.—Kiangsu. Shanghai, *Faber*.—Chekiang. King Yuan, 900-1200 m., VII-IX. 1924, *Ching* 2384. Lai Pai Shan, VIII. 1927, *Keng* 1154.—Kiangsi. Lien-huaan, Luskan, 1120 m., 1. IX. 1932, *Tsiang* 10763. Sai Hang Cheung, Tung Lei Village, Kiennan Distr., 1-11. IX. 1934, *Lau* 4372. Chi Shan, Lam Uk Village, Lungnan Distr., 1-25. X. 1934, *Lau* 4766.—Kweichow. Tating, 13. IX. 1930, *Tsiang* 8952. Yun-fou-shan, near Pinfu, Kweiting, 600 m., 1. VII. 1930, *Tsiang* 5526. Ta Ho Yen, Fan Ching Shan, 24. X. 1931, *Steward et al.* 715.—Kwangsi. Tan-Ngar, 10 li east of Hoo-Chi, 1700 ft., 12. VII. 1928, *Ching* 6423.—Yunnan. Between Likang and Talifu, VIII. 1922, *Rock* 6386. South of Red River, *Henry* 11215. Zou-ke-suin, 3000 m., *Maire* 3482. Reported also from Fukien and Shensi by Kudo.

MANCHURIA.—Schilka, Amur, Sungari, 1859, *Maximowicz*. Ussuri, *Maximowicz*. Coast of Manchuria, 44°-45°N, 1859, *Wilford*.

JAPAN.—Without data, *Siebold*.—Hokkaido. Hakodate, 1861, *Maximowicz*. Hakodate, 1861, *Albrecht*. Southern Hokkaido, 1884, *Brooks* 343. Sapporo, Mt. 1. VIII. 1925, *Moiwa*, *Ichikawa* 200 (631). Sapporo, 3. IX. 1903, *Arimoto*. Sapporo, 5. VIII. 1929, *Tanaka* 234. Sapporo, VIII. 1889, *Tokebuchi*. Sapporo, 27. VIII. 1885, *Miyabe*, Sapporo, H. VIII. 1891, *Tokebuchi*. Fukuyama, 19. VII. 1890, *Miyabe* and *Tokebuchi*. Yakatohara, 22. VIII. 1894, collector not stated. Prov. Rikuzen, 2. IX. 1926, *Lisiba*. Prov. Musashi, 19. IX. 1927, *Masamune*. Prov. Mutsu, 17. VIII. 1911, collector not stated. Reported also from Honshu, Kyushu, Formosa and Korea by Kudo.

#### 4. *A. FOENICULUM* Kuntze, Rev. Gen. 511. 1891.

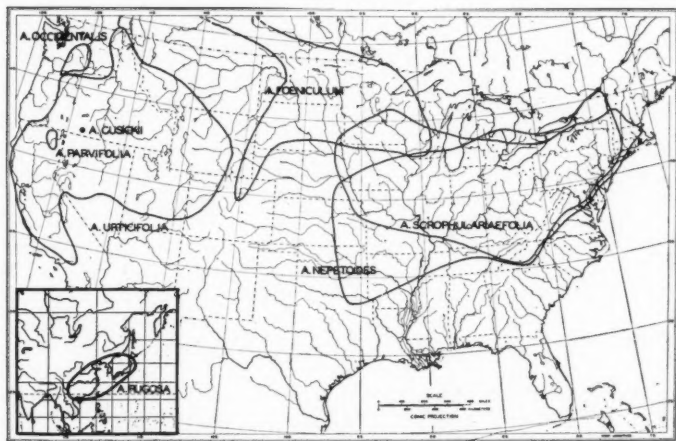
*Hyssopus anethiodorus* Nutt. in Fraser's Cat. 1813 (nomen subnudum).—*Stachys Foeniculum* Pursh, Fl. Am. Sept. 407. 1814—*Hyssopus anisatus* Nutt., Gen. 2:27. 1818; type collected by Nuttall "on the plains of the Missouri near Ft. Mandan." A specimen, probably authentic, from Durand's herbarium but without Nuttall's characteristic ticket, is in the Gray Herbarium; none are apparently at Kew or at the British Museum.—*H. Foeniculum* Spreng., Nov. Prov. Hort. 24, 1819.—*H. discolor* Desf., Cat. Hort. Par. Ed. 3. 97. 1829 An authentic specimen is in the Cosson Herbarium at Paris.—*Lophanthus anisatus* Benth., Bot. Reg. sub. t. 1282. 1829.—*Vlechia anisata* Raf., Fl. Tellur. 3:89. 1896.—*V. Foeniculum* MacMill., Metasp. Minn. 449, 1892.—*V.*

*anethiodora* Greene, Mem. Torr. Bot. Club 5:282. 1894.—*Agastache anethiodora* Britton in Britton & Brown, Ill. Fl. 3:85. 1898.

Stems mostly less than a meter tall, usually strict and but little branched, finely pubescent only in the inflorescence; leaf blades ovate or deltoid-ovate, firm rather than membranous, the median mostly 5-8 cm. long, 3-5 cm. broad, acute or somewhat acuminate, rounded or tending to truncate at the base, the lower sometimes subcordate, serrate, the serrations mucronate, upper surfaces green and glabrous, somewhat glossy, the lower densely covered with minute appressed hairs, feltlike, more or less whitened or even glaucous; petioles of median leaves mostly 1-2 cm. long, glabrous or sprinkled with jointed hairs which sometimes continue onto the midrib; spikes 4-8 cm. long, 1.5-2 cm. broad at maturity, submoniliform or sometimes compact, the lower verticils sometimes remote; bracts ovate, acuminate, mostly shorter than the calyces, uniformly hirtellous, often violet tinged; calyces hirtellous throughout with fine spreading hairs, the tubes 5-7 mm. long, the teeth thin, tending to narrowly deltoid and acute, 1-2 mm. long, always violet-tipped, sometimes strongly so, (white in albino forms), the veins visible but not prominent; corollas blue, the tubes 6.5-7.5 mm. long; nutlets about .8-1.2 mm. long; apical hairs relatively long, fine and white.

A specimen collected at Lewis, Wisconsin, by J. J. Davis (Univ. of Wisconsin) suggests a possible intermixture with *A. scrophulariaefolia*. The pubescence, the leaf shape, the calyces, all suggest this conclusion.

*Distribution* (Map 1).—Ranges through WISCONSIN, MINNESOTA, IOWA (Clayton and Emmet Counties), NORTH and SOUTH DAKOTA, to WYOMING and COLORADO, and in CANADA from western ONTARIO to ALBERTA. It has also been collected, probably as an escape, in CONNECTICUT (Portland), NEW YORK (Newcomb, Long Beach), KENTUCKY (Shelbyville), QUEBEC (Labelle County), and ONTARIO (Kingston).



Map 1. Distribution of Section 1.—Chiastandra.

5. *A. OCCIDENTALIS* Heller, Muhlenbergia 1:4. 1900.

*Vlechia occidentalis* Piper, Erythea 6:31. 1898. Type collected by Elmer (no. 396) 6 miles southwest of Ellensburg, Wn. (U. S. Natl. Herb.).—*Lophanthus occidentalis* K. Schum., Justs Jahresb. 26:387. 1900.

Stems mostly simple, usually less than a meter tall, thinly puberulent to glabrous; leaf blades firm rather than membranous, ovate or deltoid-ovate, the median 3-6 cm. long, 2-4 cm. broad, usually abruptly acuminate with a blunt tip, sometimes acute, mostly truncate or subcordate at the base, crenate-serrate, their margins narrowly inrolled, the upper surfaces essentially glabrous, or at most, minutely puberulent, somewhat glossy, the under surfaces tomentellous, canescent; petioles mostly 1-3 cm. long, puberulent, sometimes with a few longer jointed hairs; inflorescence 3-12 cm. long, 2-2.5 cm. broad, compact, the lower verticil rarely remote, the bracts ovate to lanceolate, acuminate; calyces mostly violet, sometimes rose, thinly hirtellous or subglabrous, the tubes mostly 4-7 mm. long, the teeth 1.7-4 mm., about 1 mm. broad at the base, acute; corollas ? violet or ? pallid, the tubes 3-12 mm. long; nutlets 1.5-2 mm. long, the apical bristles stiff.

The morphology of this species suggests the possibility of its being an amphiploid between *A. urticifolia* and *A. Foeniculum*.

Distribution (Map 1).—WASHINGTON. Chelan County, Wenatchee, Whited 143½. Tumwater, 1400 ft., Otis 956. Tumwater Canyon near Leavenworth, 1000 ft., Thompson 8423. Leavenworth, Thompson 6747.—Douglas County. Egbert Spring, Sandberg and Leiberg 353.—Kittitas County. Ellensburg, Elmer 396. Ellensburg, basaltic ledges among sagebrush, Thompson 9045. Upper Naches River, Grant 3340. Upper Naches River, Henderson. Schnebley Coulee, 2200 ft., H. W. Smith 692.—Yakima County, Mt. Adams, Suksdorf 472. Rattlesnake Mountains, 2500 ft., Cotton 673. Timpico, Flett 1040. Umtanum Creek, St. John 7867.

6. *A. URTICIFOLIA* Kuntze, Rev. Gen. 511. 1891.

*Lophanthus urticifolius* Benth., Bot. Reg. sub t. 1282. 1829. Type collected by Douglas on the "northwest coast" of North America (Kew). Douglas' plant is well matched by Sandberg 263 at Kew.—*Vlechia urticifolia* Raf., Fl. Tellur. 3:89. 1836.—*Agastache glaucifolia* Heller, Muhlenbergia 1:32. 1900. Type collected by Heller (no. 5792) between Knights Valley and Mark West Springs, California.

Stems much branched, 1-2 m. tall or more, essentially glabrous; leaf blades tending to membranous, mostly ovate or deltoid-ovate, the median 3.5-8 cm. long, 2.5-6 cm. broad, obtuse or acute, often acuminate, mostly truncate or subcordate at the base, sometimes cordate, mostly coarsely serrate, the upper surfaces mostly glabrous, sometimes pubescent, often appearing glossy, the lower glabrous to pubescent, usually paler; inflorescence 4-15 cm. long, compact, tapering, the lowest verticils sometimes remote, the bracts ovate to lanceolate, acuminate; calyces green or rose, at least at the tips, usually hirtellous, or glabrous, membranous, the tubes mostly 4-7 mm. long, the teeth deltoid-lanceolate, 2.5-5 mm. long, mostly acuminate; corollas rose or violet, the tubes 8-13 mm. long; nutlets 1.5-2 mm. long.

Two geographic races can be discerned, characterized by pubescence differences which are apparently not correlated with any other characteristics. The

typical and widespread form is essentially glabrous. It occurs in eastern Washington and the Rocky Mountain States and ranges from Washington southward into Oregon, Nevada and California. In California it has been found only in Modoc, Siskiyou and Humboldt counties. The second race is clearly pubescent, even to the naked eye. The hairs are fine and wavy and of a certain magnitude. They resemble those of *A. rugosa* and *A. scrophulariaefolia* var. *mollis*. In typical form this race is found only in California where it ranges in the Sierra Nevada from Plumas County southward, in the North Coast Ranges from Humboldt County to Marin County, and at isolated stations in San Luis Obispo, San Bernardino and Riverside Counties. It was named *A. glaucifolia* by Heller. However, it is connected with the glabrous forms by all gradations, but, although the hairs of the intermediates are smaller and often scant, they are nevertheless not feltlike and individually obscure as in *A. parvifolia* and *A. occidentalis*. These intermediate gradations are geographically intermediate and are found in company with both the glabrous and pubescent races in south central Oregon, western Nevada and in California where they range from Modoc County southward in the Sierra Nevada, and from Siskiyou County to Mendocino County in the North Coast Ranges.

*Distribution* (Map 1).—*Glabrous form*.

BRITISH COLUMBIA. Cascade, near international boundary between the Kettle and Columbia Rivers.

MONTANA. Carbon County. Red Lodge.—Gallatin County. Gallatin.—Lewis and Clark County. Helena.—Madison County. Madison Range.—Mineral County. Fish Lake Trail.

WYOMING. Natrona County. Loomis Creek; Casper.—Teton County. Jackson Hole. Spread Creek. Grand Teton. Teton Pass.—Uinta County. Teton Mountains. La Barge.

COLORADO. Garfield County. Glenwood Springs.—Gunnison County. Crested Butte. Cerro Summit. Mt. Carbon. Elk Mountain. Gunnison Forest.—Rio Blanco County. North Elk Canyon. Flag Creek. Aldrich Lake.—Routt County. Williams Fork. North Park Range. Glen Eden. Steamboat Springs.

IDAHO. Adams County. Evergreen.—Bannock County. Camp Tendency.—Beaver County.—Blaine County. Sawtooth Range. Mt. Hyndman. Boulder Creek Canyon. Ketchum.—Boise. Sawtooth Mountains. Sweet.—Canyon County. Bill Willow.—Custer County. Wild Horse Creek.—Clark County. Spencer.—Elmore County. Trinity. Fremont County. St. Anthony.—Latah County. Potlach. Thatuna Hills.—Lemhi County. Salmon. Long Tom Mt. Jessie Creek Canyon.—Nez Perces County. Lake Waha. Hatwai Creek.—Oneida County. Preston.—Owyhee County. Silver City. Devil Creek.—Palouse County.—Shoshone County. Clarkia. Fish Lake. Forks of St. Mary's River. Washington County. Rush Creek. Tamarack.

UTAH. Beaver County. Beaver City.—Cache County. Logan. Iron County. 10 miles east of Cedar City.—Joab County. Mt. Nebo.—Morgan County. Peterson Canyon. Peterson.—Piute County. Bullion Creek, near Marysville.—Salt Lake County.—Alta. City Creek Canyon. Cottonwood Canyon.—Sanpete County. Ephraim Canyon. Mill Canyon, east of Mt. Pleasant.—Sevier County. Gooseberry Ranger Station. Fishlake National Forest. Pioneer Ranger Station. Fillmore National Forest. Salina Exp. Station.—Summitt County. Altus. Bear River Valley.—Utah County. American Fork Canyon. Bottle Creek Canyon. Rock Canyon near Pino.—Wasatch County. Clayton Peak.—Weber County. Ogden Canyon near Ogden.

NEVADA. Elko County. Parks Station, 25 miles north of Elko. Harrison Pass Ranger



Station, Ruby Mountains. Lamoille. Humboldt Forest. Gold Creek.—*Lander County*. Austin.—*Nye County*. Monitor Range. Toiabe Mountains.—*Pershing County*. East Humboldt Mountains. Storey County. Virginia City.—*Washoe County*. Ophir Creek.

WASHINGTON. Columbia County. Blue Mountains.—*Lincoln County*. Grand Coulee Dam. Fort Wilbur.—*Okanogan County*. Republic.—*Spokane County*. Clark Springs.—*Whitman County*. Pullman.—*Walla Walla County*. Walla Walla.

OREGON. Baker County. Sumpter Valley Watershed, Blue Mountains.—*Douglas County*. Diamond Lake.—*Harney County*. North end of Steins Mts. 15 miles north of Burns. Alvord Ranch.—*Hood River County*. White River Grove south of Mt. Hood.—*Jackson County*. Ashland.—*Josephine County*. Oregon Caves.—*Klamath County*. Englenook. Swan Lake Valley. Yainax Mountain. Klamath Reservation. South end of Klamath Lake. Ft. Klamath.—*Lake County*. Lake Abert. Crane Mountain near Lakeview. Lake.—*Umatilla County*. Meacham. Clarks Ranch. North fork John Day River.—*Union County*. Blue Mountains. La Grande. Union.—*Wallowa County*. Anervia Lake to Wallowa Lake. Horse Creek Canyon.

CALIFORNIA. Humboldt County. Elk Horn Prairie. Corral Prairie.—*Modoc County*. Parker Creek. Warner Mountains. Cedar Canyon. Niell Canyon.—*Plumas County*. 3 miles west of Lake Almanor.—*Siskiyou County*. Finleys Upper Camp. Indian Creek. Moffit Creek.—*Trinity County*. Stuarts.

*Pubescent form.*

CALIFORNIA. Alpine County. Mogul. Hermit Valley. Woodford. Charity Valley. Iceberg Meadow Ranger Station.—*Amador County*. Calaveras County. Gardner. Big Trees.—*Eldorado County*. Angora Lake. Glen Alpine. Pyramid Peak.—*Fresno County*. Pine Ridge. Shaver.—*Humboldt County*. Buck Mountain. South Fork Mountain. Hooper Valley. Elk Prairie.—*Marin County*. Paper Mill.—*Lake County*. Allen Springs. Mt. Sanhedrin. Kelseyville. Bartlett Springs.—*Mariposa County*. Yosemite Valley. Lake Tenaya.—*Mendocino County*. Longvale. Ukiah. Potter Valley.—*Modoc County*. Goose Lake Valley.—*Nevada County*. Emigrant Gap. Soda Springs. Truckee River. Donner Lake.—*Placer County*. Lake Tahoe. Wards Creek. Cisco.—*Plumas County*. Feather River near Nelson Point. Quincy. Sierra Valley. N. Fork. American River. Prattville. Long Lake. Big Meadows.—*Riverside County*. San Jacinto Mountains.—*San Bernardino County*. City Creek Canyon. Edgar Canyon.—*San Luis Obispo County*. San Luis Obispo. Jack Creek Bridge on Dover Canyon Road. Lopez Canyon.—*Sierra County*. Packer Lake Creek.—*Sonoma County*. Russian River to Guerneville. Knights Valley to Mark West Springs. Healdsburg. Skaggs Springs. Santa Rosa.—*Siskiyou County*. Salmon Summit. Rush Creek.—*Tulare County*. Bearpaw Meadows. Mineral King. Pine Flat Reservoir. Niagora Creek.—*Tuolumne County*. Pine Crest. Miguel Meadows. *Trinity County*. South Fork Mountain. Mad River Store.

NEVADA. Humboldt County. Pine Forest Mountains. Santa Rosa Mountains.—*Nye County*. Toiabe Forest. Bunker Hill. Big Creek. Toiabe Mountains.—*Ormsby County*. Carson City. Kings Canyon.—*Pershing County*. East Humboldt Mountains. Clover Family.—*Washoe County*. Reno.

OREGON. Crook County. Ochoco Creek. 18 miles east of Prineville.—*Grant County*. Prairie City.—*Harney County*. Stinking Water.—*Jackson County*. Siskiyou Summit.—*Klamath County*. Buck Lake. Keno.—*Lake County*. Loveless Creek.—*Union County*. Elgin.

7. A. PARVIFOLIA Eastwood, *Leaf. West. Bot.* 2:284. 1940.

Stems slender, less than a meter tall, branching, the internodes elongate relative to the leaves, thinly puberulent; leaf blades rather firm, mostly deltoid or deltoid-ovate, the median 2-3.5 cm. long, 1-1.5 cm. broad, mostly acute, truncate or subcordate at the base, coarsely serrate, the upper surfaces densely



puberulent, the lower tomentellous, the individual hairs obscure, even under a lens; petioles usually 1-2 cm. long, puberulent; inflorescence compact, tapering, 6-9 cm. long, 1.5-3 cm broad, the lower verticils sometimes remote; bracts ovate or lanceolate-acuminate; calyces rose, and minutely pubescent with curled hairs, the tubes 5-6 mm. long, the teeth 4-7 mm. long, linear-lanceolate, awnlike, subequal; corollas probably pallid, the tubes 9.5-11 mm. long; nutlets 1.5-1.8 mm. long.

*Distribution* (Map 1).—CALIFORNIA. *Modoc County*. Shores of Egg Lake, in lava, 12. VI., 24. VII. 1893, *M. S. Baker*.—*Siskiyou County*. Bray, 7. VI. 1915, *L. E. Smith*. Lava Beds Natl. Mon., Sconshin Butte, 8. VI. 1935, *Applegate 9454*. Same, Capt. Jack's Ice Cave, 12. VI. 1935, *Applegate 9529*. Same, Indian Wells Ranger Station, 7. VI. 1935, *Applegate 9406*. Same, Indian Wells, 10. VI. 1935, *Applegate 9462*.—*Shasta County*. Hat Creek, 10. VII. 1941, *Ferris 10482*. Burney Falls, *Epling*.—*Lassen County*. Without place, 15. VII. 1894, *Stephens*. Dry Valley, *Austin 1426*. Eagle Lake, 5000 ft., 30. VI. 1897, *M. E. Jones*.

#### 8. A. CUSICKII Heller, *Muhlenbergia* 1:32. 1900.

*Lophanthus Cusickii* Greenm. in *Erythea* 7:19. 1899. Type collected by Cusick (no. 2001) in Stein's (Stein's) Mts. Oregon (Gray Herb.).

Stems less than 5 dm. tall, arising from a woody sort of root-stock, tufted, unbranched, puberulent throughout; leaf blades deltoid-ovate, the median 1.5-2.5 mm. long, 1-1.5 mm. broad, mostly acute, cuneate at the base, irregularly serrate or crenate, both surfaces puberulent with small curled hairs, scarcely feltlike; petioles .5-1 cm. long, puberulent; inflorescence compact, 3-5 cm. long; bracts ovate, acuminate; calyces rose, thin, puberulent, the tubes 6-6.5 mm. long, the teeth 4.5-5.5 mm. long, lanceolate, acuminate, thin and scarious, subequal; corollas probably pallid, glabrous within, the tubes about 9 mm. long; nutlets 1.5-2 mm. long.

Typical *A. urticifolia* has also been collected in Stein's Mountains.

*Distribution* (Map 1).—OREGON. Summits and sides of Stein's Mountains, 4. VII. 1898, *Cusick 2001*. Stein's Mountains opposite Devine Ranch, 2100 m., 5. VII. 1896. *Leiberg 2487*.

### II. Sect. BRITTONASTRUM

*Brittonastrum* Briq. in Engler u. Prantl, *Nat. Pflanzenf.* 4:3a. 234. 1896, based upon *B. mexicanum*, *B. pallidum*, *B. aurantiacum*, *B. micranthum*, *B. coccineum* and *B. canum*. Being the eldest name and well represented in herbaria, *A. mexicana* is proposed as the standard species of the section.

Inflorescence sometimes evenly spicate, but tending to be interrupted-spicate or narrowly paniculate, the cymules then pedunculate and evident. Lateral lobes of the corolla more closely joined to the upper lip than to the lower, the orifice thus tending to be more oblique; tubes glabrous within. Stamens parallel, the pairs not crossing.

The close integration of this section with the previous one in all respects save the conformation of the stamens, suggests its reference to *Agastache* rather than its generic segregation. The relationship is especially close in the case of *A. pallidiflora*, many specimens of which are readily confused with

specimens of *A. urticifolia*, save for the stamens. It is of interest, also that *A. pallidiflora*, the most complex group in the genus, should be intermediate in geographic position between the sections. No cytological data are available which might indicate the nature of this complex, but it is tempting to assume that it may be polyploid.

## KEY TO THE SPECIES

- A. Corolla tubes 2.5-5 mm. long; calyx tubes 2 mm. long or less.
  - B. Spikes interrupted, moniliform, the whorls distinct; leaves deltoid, tending to be about twice as long as broad; corollas rose purple, the tubes 3-5 mm. long. ....13. *A. Wrightii*
  - BB. Spikes more or less continuous, the lower whorls often distinct but the upper approximate or crowded; leaves narrowly deltoid or deltoid-lanceolate, tending to be about three times as long as broad; corollas white, the tubes 2.5-3 mm. long .....14. *A. micrantha*
- AA. Corolla tubes 6-30 mm. long; calyx tubes usually more than 3 mm. long.
  - B. Leaves either wholly entire, or, if toothed, toothed only toward the base, the upper margins entire, such toothed leaves being chiefly basal; corolla tubes 15-30 mm. long (if Mexican plants see also 18. *A. mexicana*).
  - c. Leaves linear or linear-lanceolate, always entire, generally less than 5 mm. broad .....20. *A. rupestris*
  - CC. Leaves ovate or ovate-lanceolate, sometimes toothed, and if so, usually near the base, generally more than 5 mm. broad .....19. *A. cana*
  - BB. Leaves crenate or serrate.
    - c. Lower surfaces of leaves tomentellous with minute hairs, feltlike; corolla tubes about 26 mm. long. Plants of Chihuahua .....15. *A. aurantiaca*
    - CC. Lower surfaces of leaves glabrous, or if pubescent, the hair not feltlike, the individual hairs evident.
    - D. Corolla tubes 19 mm. long or more.
      - E. Calyx tubes 4-5 mm. long .....17. *A. coccinea*
      - EE. Calyx tubes 6.5-11.5 mm. long.
        - F. Upper lip of calyces usually 2.5-4 mm. long; leaves mostly deltoid and crenate throughout; calyces usually deep rose-purple throughout; stems from a woody caudex; plants ranging from Durango northward to Arizona .....16. *A. Barberi*
        - FF. Upper lip of calyces usually 3.5-6 mm. long; leaves deltoid-lanceolate and often serrate only below the middle; stems from creeping rhizomes; plants ranging from Zacatecas southward to Puebla .....18. *A. mexicana*
    - DD. Corolla tubes usually less than 18 mm. in length.
      - E. Calyces 8 mm. long or less (see also 9. *A. pallidiflora*).
      - F. Corollas 15-18 mm. long, twice the length of the calyces, slender ....12. *A. Pringlei*
      - FF. Corollas 12 mm. long or less, the tube but little exerted beyond the calyx teeth .....11. *A. breviflora*
    - EE. Calyces 8-10 mm. long, or if shorter, then Texan plants; corollas mostly 11-18 mm. long.
      - F. Plants of eastern Mexico from Nuevo Leon to Vera Cruz .....10. *A. Palmeri*
      - FF. Plants of the southwestern United States and adjacent Mexico, southward to Durango.
        - g. Corollas usually about twice as long as the calyces, their tubes 13-18 mm. long; calyces deep rose-purple; calyx teeth subulate, very acute, 3-4 mm. long; plants ranging from S. Arizona to Durango .....9c. *A. pallidiflora* subsp. *Mearnsii*
        - gg. Corollas usually not more than half as long as the calyces, or if

twice as long, the calyx teeth deltoid, 1-2 mm. long; calyces rose color or green.

H. Calyx tubes 4-5 mm. long; Texan plants, the teeth usually tending to flare somewhat .....9d. *A. p.* subsp. *Havardi*

HH. Calyx tubes 5-8 mm. long, the teeth seldom tending to flare.

J. Calyces green, with whitish teeth, the corollas pallid or whitish .....9a. *A. p.* subsp. *typica*

JJ. Calyces rose, or if green, usually with rose colored teeth; corollas rose .....9b. *A. p.* subsp. *neomexicana*

9. *A. PALLIDIFLORA* Rydb. in Bull. Torr. Bot. Club 33:150. 1906.

*Brittonastrum pallidiflorum* Heller, op. cit. 26:621. 1899. Type collected by MacDougal (no. 313) in a canyon near the eastern base of Bill Williams Mountain, Arizona.

Stems usually simple, 40-60 cm., or as much as 1 m. tall, ascending from a woody caudex; leaf blades prevailingly deltoid-ovate, mostly 2.5-4 cm. long, 2-3.5 cm. broad, infrequently 5-6 cm. long, 4.5-5.5 cm. broad, mostly obtuse, truncate or shallowly cordate at the base, crenate-serrate, hirtellous on the upper surfaces but green, finely and usually sparingly pubescent on the lower, sometimes nearly glabrous; median petioles mostly about 1 cm. long, rarely 2 cm., the lower usually somewhat longer; verticils sessile, usually crowded into continuous cylindrical spikes, the lowermost sometimes approximate or remote; calyces green, rose or deep rose-purple, hirtellous with spreading hairs, the tubes usually 5-8 mm. long, or in one subspecies 4-5 mm. long, the teeth quite variable in shape and relative size, deltoid or almost subulate, 1-4 mm. long, mostly 1.5-3 mm.; corollas whitish or rose, their tubes 9-18 mm. long.

a. subsp. *typica* nom. nov.

Calyces green with whitish teeth, their tubes mostly 5-8 mm. long; corollas white or pallid, their tubes 9-13 mm. long.

*Distribution* (Map 2).—ARIZONA. *Apache County*. White Mountains, 6 miles south of Hannigan Meadow, 9000 ft., *Kearney and Peebles 12270*, 60 miles north of Clifton, *Allen 3143*. *Riverside Ranger Sta.*, Greer, 2700 m., *Eggleston 17077*. White Mountains, *Griffiths 5248*. White Mountains, Thompson's Ranch, *Gooding 597*.—*Coconino County*. Mogollon Mountains, Baker's Butte, 7000 ft., *Mearns*. Mogollon Mountains, Buck Springs Ranger Sta., 7500 ft., *Collom 629*. Flagstaff to Mogollon, *Griffiths 4990*. Flagstaff, *Purpus 8104*. Flagstaff, 7000 ft., *Hanson 485*. Flagstaff, 7000 ft., *Collom 666*. Bill Williams Mountain, 7400-9264 ft., *Kearney and Peebles 14032*. Bill Williams Mountain, 7000 ft., *McDougal 313*. Bill Williams Mountain, *E. Palmer*. Bill Williams Mountain, *Rusby*. San Francisco Mountain, *Knowlton 4*. San Francisco Mountain, 2100 m., *Leiberg 5809*. San Francisco Mountains, *Toumey*. San Francisco Mountain, *Cannon and Lloyd*. San Francisco Mountain, 9000 ft., *Wolf 3153*. San Francisco Mountains, *Kearney & Peebles 12110; 12181*. Mt. Humphrey, 6600 ft., *Kunze*. Grand Canyon, *Armstrong 236*.—*Mohave County*. Kaibab Forest, 8350 ft., *Kearney & Peebles 13749*.—*Yavapai County*. Fort Verde, *Mearns 118*.

NEW MEXICO. *Catron County*. Mogollon Mountains, *Rusby 339*. Gilita Camp Ground, 20 miles northeast of Mogollon, 8000 ft., *Hitchcock et al. 4421*. Mogollon Mountains, middle fork of Gila River, 8500 ft., *Metcalfe 538*. Mogollon Mountains, N. Bar Ranch, *Wooton*.

COLORADO. *Archuleta County*. Pagosa Springs, 7000 ft., *B. H. Smith*.—*Mineral County*. Pagosa Peak, 9000 ft., *Baker 566*.—*Ouray County*. Mineral Point, 9-10,000

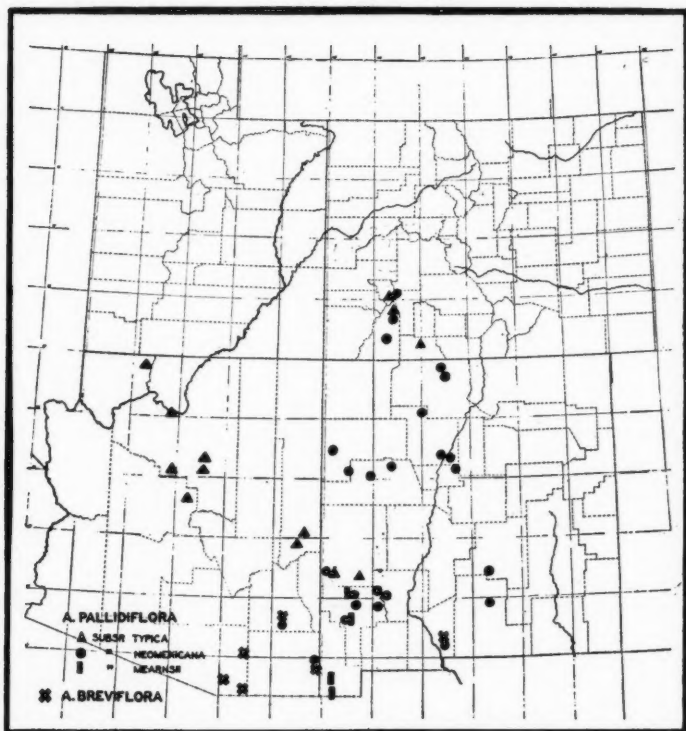
ft., *Purpus* 604. Ouray, Shear. Ouray, Clements.—(?) San Juan County. Animas Valley, 9500 ft., *Brandegge* 1160.

b. subsp. *neomexicana* comb. nov.

*Brittonastrum neomexicanum* Briq., Ann. Conserve. Geneve 6:158. 1902. Type collected by Wootton (no. 266) in the White Mountains, New Mexico (Delessert Herb.)—*Agastache neomexicana* Standley, Contrib. U. S. Natl. Herb. 13:211. 1910.—*Brittonastrum Greenei* Briq., op. cit., 157. Type collected by Baker (no. 567) at Chama, New Mexico (Delessert Herb.)—*Agastache Greenei* Wootton & Standley, Contrib. U. S. Natl. Herb. 16:167. 1913.

Calyces rose, at least on the teeth, their tubes mostly 5-8 mm. long; corollas rose, their tubes 9-15 mm. long.

*A. Greenei* is seemingly an unstable form intermediate between *A. neomexicana* and *A. pallidiflora*. At Ouray and Pagosa Peak in Colorado and in the Mogollon Mountains and at Chama in New Mexico, both green and rose colored forms apparently occur either near each other or together. Specimens



Map 2. Distribution of *A. pallidiflora* (in part) and *A. breviflora*.

from the Sandia Mountains of New Mexico suggest a more robust plant with notably larger leaves.

*Distribution* (Map 2).—ARIZONA. Cochise County. Chiricahua Natl. For., Barfoot Station to Paradise, 2200 m., Eggleston 10870. Barfoot Park, Blumer 1407. Rustlers Park Trail, Chiricahua Natl. For., 2480-2670 m., Eggleston 10779.—Graham County. Pinaleno Mountains, Riggs Flat, 8000 ft., Shreve 5359. Pinaleno Mountains, above Turkey Flat, 8300 ft., Kearney & Peebles 14112. Mt. Graham, 7500-9000 ft., Kearney & Peebles 9788; 9869. Mt. Graham, 6000 ft., Hutchinson 7538.

COLORADO. La Plata County. Above Durango, Hamors Lake, Baker, Earle & Tracy 627.—Ouray County. Ouray, 2500-2600 m., Underwood & Selby 276. Ouray, Shear 4123.—San Juan County, 20 miles south of Silverton, 9000 ft., Rollins 1521.

NEW MEXICO. Bernalillo County. Sandia Mountains, Koelz.—Catron County. West Fork of Gila, Mogollon Mountains, Wooton; Metcalfe 348. Mogollon Mountains, 18 miles west of Mogollon, on Willow Creek, 7640 ft., Wolf 2653.—Dona Ana County. Organ Mountains, Fillmore Canyon, Wooton.—Grant County. Black Mountains, Black Creek, 6000 ft., Archer 380. Gila Forest, 2250 m., Eggleston 16008. 15 miles north of Silver City, 7000 ft., Hitchcock et al. 4387. Burro Mountains, 1800-2180 m., Eggleston 16470. Pinos Altos Mountains, M. E. Jones 28737. East Canyon tributary to Mimbres Valley, Holzinger. Black Range, between Sawyers Peak and Hillsboro Peak, 9000-11,000 ft., Pilsbry.—Lincoln County. Alto, 7000 ft., Fisher 36124. White Mountain Peak, Wooton. White Mountains, 7000 ft., Wooton 266; Wooton & Standley 3643.—McKinley County. Defiance, Marsh 228. Ramah, Wooton. Tunitcha Mountains, Standley 7660.—Otero County. Vicinity of Cloudcroft, Sacramento Mountains, 8650-9000 ft., Humphrey 24; Wooton; Barlow; Orcutt 1326; Schulz 269; Randall; Fisher; Slater.—Rio Arriba County. Brazos Canyon, Standley & Bollman 10846. Chama, Baker 567; Standley 6603; 6678.—Sandoval County. La Jira, Jicarilla Apache Res., 2150-2470 m., Standley 8248. Sandia Mountains, Fr. Arsene 22984. Sandia Mountains, Ellis 291. Sandia Mountains, Placitas, Wooton. Bernalillo, 1550 m., Fr. Arsene & Benedict 16310.—Sierra County. Kingston, Cory 33171. Black Range, Goodding 3161; Hutchinson 7803; Metcalfe 1421; Pilsbry.—Socorro County. White Creek Ranger Sta., Gila Forest, 2540 m., Eggleston 16871.—Valencia County. Paxton, Hutchinson 7839. San Mateo Mountains, Mt. Taylor, 2600-3400 m., Eggleston 18771.

c. subspp. *Mearnsi* comb. nov.

*A. Mearnsii* Wooton and Standley, Contrib. U. S. Natl. Herb. 16: 167. 1913. Type collected by Mearns (no. 2251) in a canyon on the east side of the San Luis Mountains, New Mexico (U. S. Natl. Herb.).

Calyces deep rose-purple, their tubes 5-8.5 mm. long, their teeth nearly subulate, 3-4 mm. long; corollas rose, usually twice as long as the calyces, their tubes 13-18 mm. long.

*Distribution* (Map 2, 3).—NEW MEXICO. Grant County. Pinos Altos Mountains, E. L. Greene. Burro Mountains, 7 miles southeast of Leopold, 7300 ft., Goldman 1517. The preceding specimens are about as well referred to subspecies *neomexicana* as to this. —Hidalgo County. Canyon on east side of San Luis Mountains, Mearns 2251. Animas Valley, Mearns 2502.

CHIHUAHUA. Rio Mayo, Cerro Quicorichi, 6000 ft., Gentry 1961. Rio Fuerte, Sierra Charuco, Gentry 1755.

SONORA. Rio Mayo, Sagaribo, Gentry 2114. La Mesa Colorado, Gentry 562.

d. subspp. *Havardi* comb. nov.

*Cedronella breviflora* var. *Havardi* Gray, Proc. Am. Acad. 20:309. 1885. Type collected by Havard in the Chisos Mountains, Texas (Gray Herb.).

Calyx tubes tinged with violet or rose, 4-5 mm. long, the teeth 1.5-3 mm. long, tending to flare somewhat; corollas (?) rose, the tubes 9-11 mm. long.

This subspecies suggests both *A. breviflora* and *A. pallidiflora*, but seems to be more clearly connected to the latter.

*Distribution* (Map 3).—TEXAS. *Brewster County*. Chisos Mountains, *Havard* 29. Same, *Pulliam Canyon*, *Cory* 26514; *Sperry* 298. Same, east slope of Casa Grande, 6800 ft., *Warnock* 989.—*Culberson County*. Guadalupe Mountains, Devils Canyon, 2000 m., *Moore & Steyermark* 3556. Same *McKittrick Canyon*, *Standley* 40563.—*Jeff Davis County*. Fort Davis, *Young* 132. Davis Mountains, Livermore Peak, *Ferris & Duncan* 2563; *E. J. Palmer* 32036.

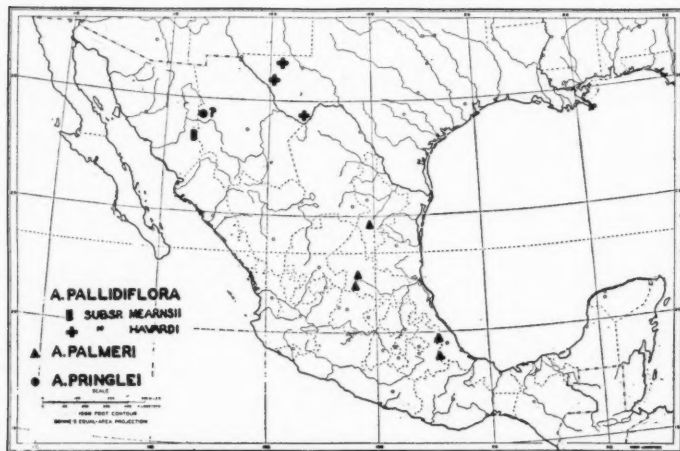
#### 10. *A. Palmeri* comb. nov.

*Brittonastrum Palmeri* Robins., *Proc. Am. Acad.* 43:25. 1907. Type collected by Palmer (no. 53) near Alvarez, San Luis Potosi, Mexico (U. S. Natl. Herb.).

Stems simple, as much as a meter tall, arising from a creeping rootstock, thinly pubescent, the upper internodes elongate; leaf blades 3-6 cm. long, prevailing ovate, sometimes deltoid-ovate, obtuse or acute, rounded at the base and somewhat cordate, crenate-serrate, the upper surfaces hirtellous, the lower more or less pubescent; median petioles mostly less than 1 cm long; verticils 12 or more flowered, compact, hemisphaeric when evident, shortly pedunculate or nearly sessile, usually crowded into dense or sometimes interrupted spikes, the lower whorls usually remote; calyces green or tinged with rose, hirtellous with spreading hairs, the tubes 6-7 mm. long, the teeth 2-4 mm. long, narrowly deltoid or deltoid-lanceolate, firm, acute; corollas rose, the tubes 12-16 mm. long; nutlets 1.3 mm. long.

Suggests *A. pallidiflora* on one hand and *A. mexicana* on the other.

*Distribution* (Map 3).—MEXICO. San Luis Potosi. "22°N latitude," *Parry & Palmer* 762. Alvarez, *E. Palmer* 53.



Map 3. Distribution of *A. pallidiflora* (in part), *A. Palmeri* and *A. Pringlei*.

Nuevo Leon. Sierra de la Cebolla, Mun. de Rayones, Muller 2900. Peak of Cerro Potosi, Mun. de Galeana, Mueller 2276.

Vera Cruz. Las Vigas, Barnes, Chamberlain & Land 116. Las Vigas, Perote, 7600 ft., Balls 4753. Orizaba Peak, Liebmann 15612. Sierra Leon, Liebmann 15575. Cruz Blanca, Liebmann 15577; 15667.

11. *A. BREVIFLORA* Epl. in Kearney and Peebles, Journ. Wash. Acad. Sci. 29:489. 1939.

*Cedronella breviflora* Gray, Proc. Am. Acad. 20:309. 1885. Type collected by Pringle (27. VII. 1884) in the Santa Rita Mts., Arizona (Gray Herb.).—*Brittonastrum breviflorum* Briq. in Engler u. Prantl, Nat. Pflanzenf., Nachtrag 1:291. 1897.—*A. verticillata* Wooton and Standley Contrib. U. S. Natl. Herb. 16:168. 1913. Type collected by Wooton & Standley in the Organ Mountains, New Mexico (U. S. Natl. Herb.).

Stems 30-60 cm. tall, with ascending, often subcorymbose branches, arising from a woody caudex, hirtellous, the internodes elongate; leaf blades deltoid-ovate, the upper sometimes narrowly deltoid, the lower deltoid-cordate, 2-3 cm., rarely 4 cm. long, obtuse or rounded at the apex, or the upper acute, truncate or subcordate at the base, coarsely crenate-serrate, the upper surfaces hirtellous, green, the lower more or less pubescent, or both nearly glabrous; petioles mostly less than 1 cm. long; verticils sessile, approximate in continuous spikes mostly 5-10 cm. long, 1.5-2 cm. in diameter, the lower whorls sometimes distant; calyces usually rose, hirtellous with spreading hairs, the tubes 3.5-5.5 mm. long, the teeth tending to subulate, firm; corollas rose, the tubes 6-10 mm. long; stamens 1.5-2.5 mm. long, scarcely exerted beyond the lip; nutlets 1.5 mm. long.

The plants of the Organ Mountains, *A. verticillata*, appear to have somewhat shorter calyces and are somewhat less pubescent but nevertheless appear to be conspecific. *A. breviflora* can be distinguished only with difficulty from the smaller flowered forms of *A. pallidiflora* subsp. *neomexicana* and may in fact be confluent with that species. Nevertheless, in the Chiricahua Mountains, Mt. Graham and the Organ Mountains, where both species have been collected, *A. breviflora* seems to maintain itself.

Distribution (Map 2).—ARIZONA. Cochise County. Chiricahua Mountains, Price Canyon, Goodding 2304. Chiricahua Mountains, Toumey. Peaks of Chiricahua Mountains, Lemmon 435.—Graham County. Mt. Graham, Peebles et al. 4495.—Pima County. Rincon Mountains, Spud Rock, 8000 ft., Blumer 3435.—Santa Cruz County. Huachuca Mountains, M. E. Jones; Price; Epling & Stewart; Wilcox 505. Same, Carr Peak, Reef road grade, Goodding 241. Same, Ramsey Canyon, Goodding 745. Santa Rita Mountains, Douglas; Pringle. Same, Madera Canyon, Peebles & Harrison 2964.

NEW MEXICO. Dona Ana County. Organ Mountains, Ellison, Wooton, Vasey, Wooton & Standley.

SONORA. San Jose Mountains, near U. S. border, Mearns 1604; 1646; 1687.

12. *A. Pringlei* comb. nov.

*Brittonastrum Pringlei* Briq., Ann. Conserve. Geneve 6:161. 1902. Type collected by Pringle (no. 789) on Potrero Peak, Chihuahua, Mexico (Delessert Herb.).



Perennial herbs 50-60 cm. tall, with ascending, often subcorymbose branches, arising from a woody caudex, minutely hirtellous, nearly glabrous, the internodes elongate; leaf blades deltoid-ovate, the median 2.5-4 cm. long, rather obtuse, subtruncate at the base, coarsely and often irregularly toothed, hirtellous, nearly glabrous; median petioles about 1 cm. long, the lower longer; verticils nearly sessile, but the branches evident, forming slender interrupted spikes as much as 30 cm. long, but scarcely moniliform, the whorls more or less hemispheric, sometimes crowded, but the lower usually remote; calyces hirtellous with spreading hairs, tinged with rose, the tubes 3.5-4.5 mm. long, the teeth 1.5-3 mm. long, narrowly deltoid or deltoid-lanceolate, firm, acute or acuminate; corollas (?) rose, the tubes 12.5-14 mm. long, slender; stamens 3.5 mm. long; nutlets 1.2 mm. long, nearly glabrous.

*Distribution* (Map 3).—MEXICO. Chihuahua. Potrero Peak, Pringle 789. Sierra Madre, 19. IX, 1887, Pringle. San Diego Canyon, Sierra Madre, 6400 ft., 16. IX, 1903, M. E. Jones. Without locality, 1885, E. Palmer.

13. *A. Wrightii* Wooton and Standley, Contrib. U. S. Natl. Herb. 16: 168. 1913.

*Cedronella Wrightii* Greenm., Proc. Am. Acad. 41:244. 1905. Type collected by C. Wright (no. 1534) in the mountains near Santa Cruz, Sonora (Gray Herb.).—*Brittonastrum Wrightii* Robins., op. cit., 43:26. 1907.

Stems 60-90 cm. tall or more, much branched, with slender ascending subfastigate branches, finely pubescent; leaves deltoid or deltoid-ovate, the median mostly 3.5 cm. long, 2-3 cm. broad, acute, mostly cuneate or truncate at the base, coarsely serrate, both surfaces finely pubescent; median petioles 1-2 cm. long; basal leaves broadly deltoid-cordate, hirsute, their petioles slender, twice as long as the blades or longer; inflorescence 10-35 cm long, moniliform, the upper whorls sometimes approximate, the lower frequently short-pedunculate; calyx tubes green, 2-3 mm. long, densely hirtellous with spreading hairs, the teeth thin, nearly glabrous, usually white or tinged with rose or violet, about 1.5 mm. long, narrowly deltoid, acuminate; corollas (?) violet, scarcely exserted beyond the calyx teeth, 3-5 mm. long; stamens about 1.5 mm. long, only slightly exserted; nutlets about 1 mm. long.

What appears to be a hybrid with *A. rupestris* has been collected in Sycamore Canyon, near Ruby, by both Goodding (no. 4521) and by Kearney and Peebles (no. 14448). It was apparently growing with *A. Wrightii*, but the other putative parent has not been reported from this area.

*Distribution* (Map 4, 5).—ARIZONA. Cochise County. Mule Mountains, Harrison 8283.—Gila County. Black River, Ft. Apache to Globe, 1500 m., Eggleston 15869. Pinal Mountains, Devils Canyon, Harrison 2094; Peebles & Harrison 5551.—Pima County. Baboquivari Mountains, Peebles, Harrison & Kearney 2765; Goodding 4522; Peebles & Harrison 559; Peebles 550.—Santa Cruz County. Sycamore Canyon, near Ruby, 3500-3700 ft., Kearney & Peebles 14433; Hardies & Proctor 6036.—10 miles southeast of Patagonia, Epling & Stewart. Canelo Hills, Centry 3296.—Yavapai County. Prescott, Peebles, Harrison & Kearney 2721.

NEW MEXICO. Grant County. Mangas Springs, 18 miles northwest of Silver City, 4850 ft., Metcalfe 655. Graham, Wooton.

CHIHUAHUA. Between Colonia Garcia and Pratts Ranch, below Pacheco, Nelson 6232. Guayanopa Canyon, 5000 ft., M. E. Jones.

14. *A. MICRANTHA* Wooton & Standley, Contrib. U. S. Natl. Herb. 16:168. 1913.

*Cedronella micrantha* Gray, Proc. Am. Acad. 8:369. 1870. Type collected by C. Wright in southwestern Texas near the border of New Mexico (Gray Herb.).—*Brittonastrum micranthum* Briq. in Engler u. Prantl, Nat. Pflanzenf. 4:3a:235. 1896.

Stems 30-60 cm. tall or more, with slender erect subfastigate branches, finely pubescent; leaves deltoid-lanceolate, thin, the median 3-6 cm. long, 1-2.5 cm. broad, acute, mostly rounded or cuneate at the base, coarsely serrate, chiefly below the middle, both surfaces hirtellous or pubescent with fine hairs; median petioles 1-1.5 cm. long; basal leaves reniform, hirsute, on slender petioles twice as long as the blade or longer; inflorescence continuous or sometimes submoniliform, at least the upper whorls usually crowded, 8-20 cm. long, 0.5-1 cm. in diameter; calyces green, minutely hirtellous with spreading hairs, the tubes 2-3 mm. long, the teeth .5-1 mm. long, commonly whitish, acute, unequal, their margins thin; corollas white, scarcely or not at all exerted from the calyx, the tubes 2.5-3 mm. long; stamens less than 1 mm long, scarcely exerted; nutlets .5-1 mm. long, glabrous.

*Distribution* (Map 4, 5).—ARIZONA. Apache County. Springerville, 5800 ft., Goldman 2417. Atascacita Spring, 2570 m., Eggleston 17055.

NEW MEXICO, Catron County. Mogollon Mts., 7500 ft., Metcalfe 448.—Dona Ana County. Organ Mountains, Wooton; Vasey; Wooton 436. Limpia Canyon, Neally 628.—Grant County. Black Range, Goodding 6035.—Mora County. Watrous, Fr. Arsene & Benedict 17484; 17397.—San Miguel County. Las Vegas, Fr. Arsene 19393.—Sierra County. Black Range, Carpenter Creek, 7000 ft., Metcalfe 1416.

TEXAS. Brewster County. Chisos Mountains, Boot Spring, Warnock 1070; Cory 30421; Mueller 8145.—Jeff Davis County. Fort Davis, 1500 m., Eggleston 17491.

CHIHUAHUA. Without locality, E., Palmer 420. Parral, Pringle 13599.

DURANGO. Durango, E. Palmer 835. 15 miles north of Guanacevi, 7500-8500 ft., Nelson 4753.

15. *A. aurantiaca* comb. nov.

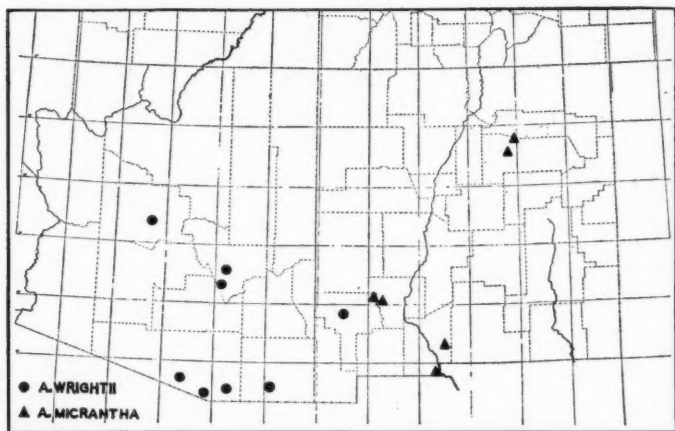
*Cedronella aurantiaca* Gray, Proc. Am. Acad. 21:408. 1886. Type collected by E. Palmer (no. 402) in ravine 150 mi. north of Batopilas, Chihuahua (U. S. Natl. Herb.).—*Brittonastrum aurantiacum* Briq. in Engler u. Prantl, Nat. Pflanzenf. 4:3a:234. 1896.

Stems apparently a meter tall or more, with ascending slender branches and elongate internodes, minutely puberulent, canescent; leaf blades narrowly deltoid (or the lower deltoid), rather firm, the median 2-3 cm. long, 1-1.5 cm. broad, obtuse, truncate-subcordate, crenate-serrate, the upper surfaces minutely hirtellous but green, the lower tomentellous, feltlike, white; petioles 3-5 mm. long; verticils mostly 6-12 flowered, mostly 1-2 cm. distant, shortly pedunculate, forming a loose narrow panicle, the internodes of the rachis about as long as the pedicels, evident; calyces campanulate or broadly tubular, the tubes 4 mm. long, hirtellous, the teeth scarcely 1 mm. long, deltoid; corollas (?) golden, the tubes about 26 mm. long; nutlets hirtellous throughout.

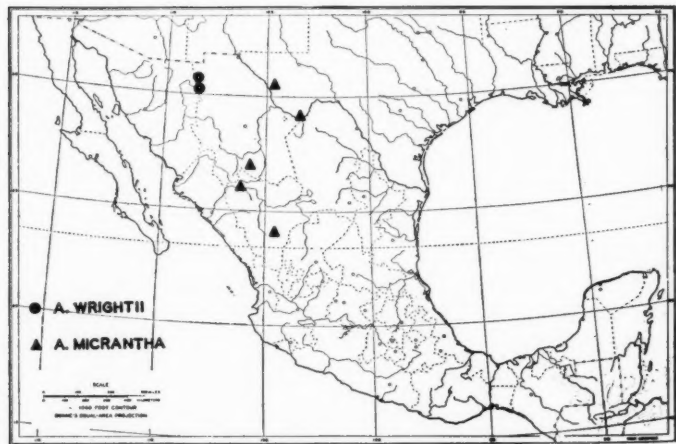
*Distribution* (Map 6).—Known only from the type locality.

16. *A. BARBERI* Epl. in Kearney & Peebles, Journ. Wash. Acad. Sci. 29:489. 1939.

*Brittonastrum Barberi* Robins., Proc. Am. Acad. 43:24. 1907. Type collected by Townsend and Barber (no. 79) at Colonia Garcia, Chihuahua (Gray Herb.).—*B. ionocalyx* Robins., Proc. Am. Acad. 43: 25. 1907. Type collected by Pringle (no. 10146) at Sandia Station, Durango, Mexico.



Map 4. Distribution of *A. Wrightii* and *A. micrantha* in Arizona and New Mexico.



Map 5. Distribution of *A. Wrightii* and *A. micrantha* in Mexico and Texas.

Stems mostly simple, 50-60 cm. tall or more, arising from a woody caudex, the upper internodes elongate, hirtellous; leaf blades deltoid or deltoid-ovate, the lower broader, the upper narrower, the median 3-5 cm. long, acute or obtuse, coarsely crenate-serrate, the upper surfaces glabrous or hirtellous, the lower more or less pubescent; median petioles mostly less than 1 cm. long, the lower longer; verticils 6-12 flowered or more, pedunculate, generally crowded and forming a loose showy reddish-purple spike 15-30 cm. long, the lower verticils sometimes remote, the internodes of the rhachis about as long as the pedicels, usually evident; calyces reddish-purple, tubular, hirtellous with spreading hairs, the tubes 7-11 mm. long, the teeth firm, narrowly deltoid, acute, 2-3 mm. long; corollas rose, the tubes 22-29 mm. long; nutlets 1.5 mm. long.

The Arizonan plants from the Patagonia Mountains are somewhat more lax and often branched.

*Distribution* (Map 6).—ARIZONA. Santa Cruz County. Patagonia Mountains, *Peebles & Harrison 4748*; *Kearney & Peebles 10122*.

CHIHUAHUA. Sierra Madre, San Diego Canyon, 6400 ft., *M. E. Jones*. Colonia Garcia, 7500 ft., *Townsend & Barber 79*. Sierra Madre about 60 miles southwest of Casas Grandes, near Colonia Garcia, *Nelson 6140*. Sierra Madre, near Guasarahi between Parral and Batopilas, 6500-6800 ft., *Goldman 157*. Municipio de Temosachic 10 miles southeast of Madera, Canyon Huahuatan, *Muller 3402*. Santa Clara Mountains, Canyon de las Vasas, 6600 ft., *Shreve 9057*. Rio Mayo, Memelichi, 7500 ft., *Gentry 2695*.

DURANGO. Sandia Station, *Pringle 10146*. El Oro to Guanacevi, *Nelson 4741*.

SONORA. ?Mountains east of Santa Cruz, *Wright 1532*. Cananea, 6100 ft., *Donnelly*.

#### 17. *A. coccinea* comb. nov.

*Cedronella coccinea* Greene, *Pittonia* 1:157. 1888. Type collected by Forrer in the Sierra Madre near Durango, Mexico. *Brittonastrum coccineum* Briq. in Engler u. Prantl, *Nat. Pflanzenf.* 4:3a:235. 1896.

Stems simple, nearly glabrous, 50-60 mm. tall, arising from creeping branched rootstocks, the internodes about as long as the leaves; leaf blades deltoid or deltoid-ovate, 4-5 cm. long, 2.5-3 cm. broad, acute, truncate or shallowly cordate at the base, crenate-serrate, the upper surfaces green, hirtellous, the lower paler, thinly pubescent; petioles mostly less than 1 cm. long; verticils about 6-flowered, rather dense, pedunculate, the peduncles erect, 4-5 mm. long, the upper verticils crowded, the lower 2-4 cm. distant, forming an interrupted spike; calyces hirtellous with spreading hairs, firm, the tubes 4-5 mm. long, the teeth firm, 3-4 mm. long, acute; corollas (?) red, the tubes 24-25 mm. long.

*Distribution* (Map 6).—DURANGO. Sierra Madre west of Durango, 8100 ft., *Forrer*. Near Durango, *Garcia 391*.

#### 18. *A. mexicana* comb. nov.

*Dracocephalum mexicanum* Kunth in Humboldt and Bonpland, *Nov. Gen. et Sp. Pl.* 2:322. 1817. Type collected by Humboldt and Bonpland in Mexico "near Valladolid, Patzcuaro and Chalco" (Paris). *Cedronella mexicana* Benth., *Lab. Gen. et Sp.* 502. 1834. *Cardoquia betonicoides* Lindl., *Bot. Reg.* 24, misc. 86. *Brittonastrum mexi-*

*canum* Briq. in Engler u. Prantl, Nat. Pflanzenf. 4:3a:235. 1896. *B. betonicoides* Briq., Ann. Conserv. Geneve 6:160. 1902.

Stems 50-60 cm. tall or more, usually simple, arising from creeping root-stocks, the upper internodes usually elongate, finely hirtellous, nearly glabrous; leaf blades lanceolate or ovate-lanceolate, the median mostly 4-6 cm. long, 1.5-2 cm. broad, acute, rounded or somewhat truncate at the base, serrate chiefly below the middle, the acumen entire, both surfaces minutely hirtellous, nearly glabrous; median petioles mostly less than 1 cm. long; verticils 12 or more flowered, compact, pedunculate, appressed to the stems, forming an interrupted or continuous spike as much as 30 cm. long and usually about 3 cm. broad, the whorls hemisphaeric when evident; calyces prevailing green but more or less tinged with rose, the tubes 6.5-11.5 mm. long, hirtellous with spreading hairs, the teeth becoming firm, narrowly deltoid or deltoid-lanceolate, acute, 2.5-4 mm. long; corollas rose or crimson, the tubes 19-27 mm. long; nutlets 1.5-2 mm. long.

*Distribution* (Map 6).—MEXICO. Temasaltepec, Tequesquipan, 2800 m., Hinton 2312.

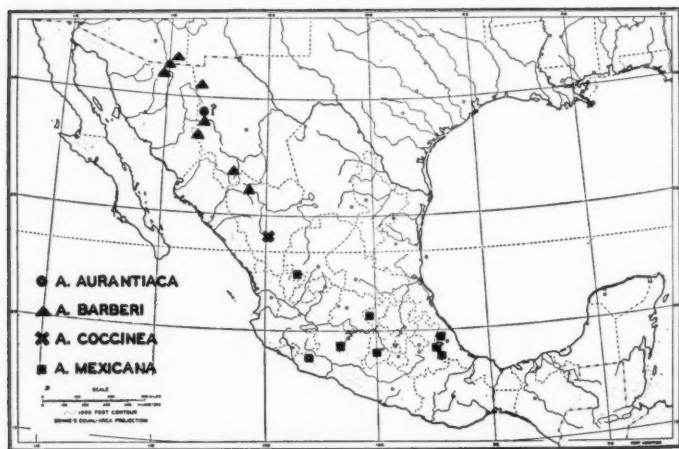
Michoacan. Coalcoman, 2350 m., Hinton 15030, above Patzcuaro, Pringle 4127.

Puebla. Chinantla, Liebmann 15566. Chalcicomula, 9000 ft., Pringle 9335.

Queretaro. Queretaro, Fr. Arsene 6088; 10613; Fr. Basil 106; Fr. Agniel 10424; Fr. Arsene 10089.

Vera Cruz. Cofre de Perote, Los Pescados, 10,500 ft., Balls 4661. Mt. Orizaba, Loma Grande, Balls 5371. Perote, above Los Molinos, 7700 ft., Balls 5525. Mt. Orizaba, 10,000 ft., Seaton 257. Mt. Orizaba, Rose and Hay 5682.

Zacatecas. Monte Ecobedo, Rose 2644.



Map 6. Distribution of *A. aurantiaca*, *A. Barberi*, *A. coccinea* and *A. mexicana*.

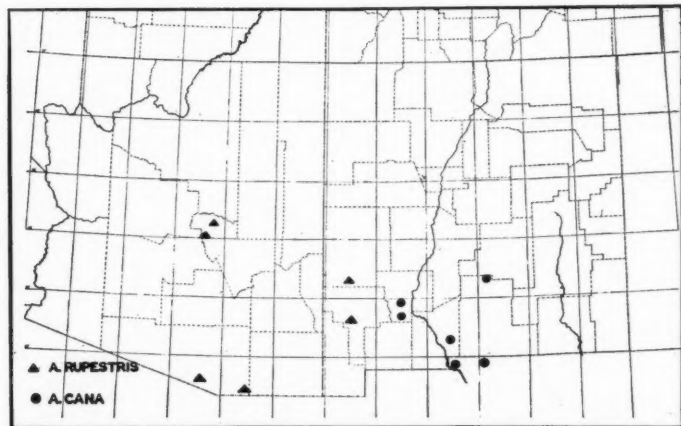
19. *A. CANA* Wooton & Standley, Contrib. U. S. Natl. Herb. 16:166. 1913.

*Cedronella cana* Hooker, Bot. Mag. t. 4618. 1851. Type collected by C. Wright (no. 474) 30 mi. east of El Paso (Kew).—*C. mexicana* var. *cana* Gray, Proc. Am. Acad. 8:370. 1870. *Brittonastrum canum* Briq. in Engler u. Prantl, Nat. Pflanzenf. 4:3a:233. 1896.

Stems 50-60 cm. tall, with numerous slender ascending branches, arising from a woody crown, minutely puberulent; lower leaves deltoid or deltoid-ovate, 1-3 cm. long, coarsely crenate-serrate, on slender petioles about as long as the blades, the median ovate-lanceolate, mostly entire, 1-2 cm. long, the uppermost nearly sessile, both surfaces minutely puberulent, but green, about equally pitted with sessile glands; verticils mostly 6-12 flowered, mostly 1-2 cm. distant, shortly pedunculate, forming a loose narrow panicle or interrupted spike as much as 30 cm. long, the internodes of the rhachis about as long as the pedicels, evident; calyces turbinate, whitish or tinged with rose, the tubes 5.5-7.5 mm. long, thinly hirtellous with spreading hairs, the teeth narrowly deltoid, 1.5-3.5 mm. long, acute or acuminate; corollas rose, thinly hirtellous or glabrous, the tubes 16-25 mm. long; nutlets 1.5-2 mm. long, usually puberulent.

*Distribution* (Map 7).—NEW MEXICO. *Dona Ana* County. Organ Mountains, 5200-6000 ft., *Wooton*; *Wooton & Standley*; *Vasey*; *Wooton* 437. *Otero* County. Sierra Blanca Mountains, *Goodding* 6041; 6042. *Sierra* County. Hillsboro, *Perchas* Creek, *Eggleston* 16308. *Lake Valley*, *Beals*. Hillsboro Canyon, *Goodding* 3162. 1 mile west of Hillsboro, 5500 ft., *Metcalfe* 1015.

TEXAS. *El Paso* County. *Baxters Canyon*, *Franklin Mountains*, *Slater*. 30 miles east of El Paso (? *Cerro Alto*), *Wright* 474.



Map 7. Distribution of *A. rupestris* and *A. cana*.

20. *A. RUPESTRIS* Standley, Contrib. U. S. Natl. Herb. 13:212. 1910.

*Cedronella cana* var. *lanceolata* Gray, Proc. Am. Acad. 20:310. 1885. *Cedronella rupestris* Greene, Pittonia 1:164. 1888. Type collected by Rusby at Mangas Springs near Silver City, New Mexico. *Brittonastrum rupestre* Heller, Muhlenbergia 1:4. 1900. *B. lanceolatum* Heller, op. cit. 1:4. 1900. *Agastache lanceolata*, Standley, Contrib. U. S. Natl. Herb. 13:212. 1910.

Stems 50-60 cm. tall or more, with slender rather divaricate branches, arising from a woody crown, minutely puberulent, incanous; leaves linear or linear-lanceolate, the median mostly 3-5 cm. long, 2-5 mm. broad, obtuse, entire, sessile or shortly petiolate, both surfaces minutely puberulent, canescent, pitted with sessile glands; verticils mostly 6-12 flowered, mostly 1-2 cm. distant, shortly pedunculate, forming a loose narrow panicle as much as 30 cm. long, the internodes of the rhachis generally longer than the pedicels, evident; calyces turbinate, whitish or tinged with rose, hirtellous with spreading hairs, the tubes 4-6 mm. long, the teeth 1-2 mm. long, deltoid, subequal; corollas rose, the tubes 20-30 mm. long; nutlets 1.5-2 mm. long, glabrous or puberulent.

What appears to be a hybrid with *A. Wrightii* has been collected in Sycamore Canyon near Ruby by both Goodding (no. 4521) and by Kearney and Peebles (no. 14448). It was apparently growing with *A. Wrightii*, but *A. rupestris* has not been reported from this area.

*Distribution* (Map 7).—ARIZONA. Gila County. Payson, 5000-6000 ft., Collom. Barnhart Pass, Mazatzal Mountains, Collom 104. Pima County. Baboquivari Mountains, Peebles and Harrison 581; Goodding 1992; Harrison 4773. Santa Cruz County. Huachuca Mountains, Mearns 2583.

NEW MEXICO. Grant County. ? Burro Mountains, Bigelow. Mangas Springs, Rusby. Catron County. Mogollon Mountains, Gila Hot Springs, Metcalfe 878. Mogollon Mountains, east fork of Gila, Wooton. Mogollon Mountains, Grand Canyon of Gila, Wooton. Mogollon Mountains, Sycamore Creek, Wooton.



## "*Euphorbia Esula*" in North America

Leon Croizat

During the last century an aggressive perennial of Eurasian origin has become thoroughly established in the fields and pastures of the United States and Canada. Although much has been printed concerning this plant (for instance, Stevens in North Dakota Agr. Coll., Agr. Exp. Sta. Bull. 162. 1922; Hanson & Rudd in op. cit. Bull 266. 1933; Barnett & Hanson in op. cit. Bull. 277. 1934; Bakke in Agr. Exp. Sta., Iowa Coll. Bull. 198. 1936; Batho in Manitoba Dept. Agr., Circ. 106 (3rd ed.). 1938), nobody agrees as to whether this pernicious weed is *Euphorbia Esula* L., *E. virgata* Wald. & Kit., or some other species or variety of the same affinity. Agronomists speak of *E. Esula* or *E. virgata* which is not surprising since professional taxonomists themselves disagree. Morton, for instance, sees (in Rhodora 39:49-50. 1937) only *E. virgata* Wald. & Kit. in the very same material which Wheeler (in Contr. Gray Herb. 127:66. 1939) coacervates under *E. Esula* L., while pointing out, parenthetically, that *E. virgata* Wald. & Kit., 1805, is preoccupied by *E. virgata* Desf., 1804. Equally unsettled is Norton's (in Missouri Bot. Gard. Rept. 11:134-139, pls. 50-52. 1900) concept of *E. Esula* L. Boissier, whose treatment still carries considerable weight, is of the opinion (in DC. Prodr. 15 (2): 159-160. 1862) that *E. Esula* L. and *E. virgata* Wald. & Kit. are distinct, which is also held by the vast majority of European taxonomists. Considering that the proper identification of this pest has immediate economic interest, and that no reference can be made with finality to a basically conflicting literature, a concise review of the "Esula" controversy is apparently necessary.

### The "Esula" Problem

The plants variously treated in North America as *E. Esula* or *E. virgata* belong to a large complex which ranges over four continents, from the tropical lands of America and Malaysia to the coldest regions of Eastern Siberia. This complex is represented in Mexico, in the West Indies, in Ethiopia, all over Europe, all over Asiatic Russia, in Asia Minor, India, China and the islands of the Sunda.

The Eurasian element of this group—which alone is of immediate interest in this review—consists, with few exceptions, of loose populations centering around local forms, all readily responsive to edaphic conditions, and often living in regions deeply disturbed by age-long cultivation and deforestation. It may be suggested, under a very broad generalization, that the "Esula" complex of Eurasia mainly consists of two streams, one characteristic of the Sarmato-Pannonian steppes and hills, the other prevalent in the parklands of Central and Western Europe. These two elements are inextricably mixed in the regions adjacent to the Black Sea and the Caspian migrating therefrom to Spain and

Portugal, at one end, to Mongolia, Eastern Siberia and China, at the other. It may be suggested further, under a broad generalization, that an exhaustive study of this area should begin with the forms endemic to the Caucasus, which appear to lie at the center of distribution.

All forms of the "Esula" aggregate possess the same basic morphological characters, often being so strikingly alike that, if its history were unknown, a specimen of Mexican origin native to the Texan boundary could not be separated definitely from another one collected wild at the northern end of the Adriatic Sea. All these plants have, or tend to have, leaves longer than broad, subsessile, entire at the margin, weakly veined with the exception of the midrib; tricocccous capsules granular to smooth at the keels; seeds with a smooth testa, usually covered by a grayish or light brown aril, and manifestly caruncled; nectaries at the cyathium of green or yellow color, truncate to horned or denticulate at the margin. In the less temperate to cold portions of their range they adapt themselves as hemicryptophytes, that is, they put forth every year new shoots from a perennial, exceedingly resistant and readily regenerated rhizome.

It may be readily inferred from this discussion of the morphology of this complex that while it is altogether easy to recognize representative forms as either *E. Esula* or *E. virgata*, hardly anything can be more difficult than to identify all their states in rigorous taxonomy. It is likewise clear that uncritically assumed concepts ultimately may lead a taxonomist to lump as one species forms endemic to three continents, and manifestly different by sums of intangibles, or, conversely, to mill out species without end, visualizing every single population as the rightful bearer of a binomial of its own. Whichever danger be greater, lumping or splitting, in dealing with the "Esula" group the writer is not prepared to state with finality. It is his definite impression, however, that lumping is nearly always worse than splitting in the long run, and that those who believe that *E. Esula* L. and *E. virgata* Wald. & Kit. are, after all, too much alike to be recognized as distinct species are perhaps not well informed as to the status of the "Esula" question on the whole.

Numerous authors in every country of Europe, from Portugal to Russia, from Sweden to Greece, have dealt, or attempted to deal with some form of the "Esula" affinity. Since a great deal of European taxonomic work is based on local floras, with comparatively little attention given to typification and distribution, it stands to reason that the very same form has been treated under different binomials or trinomials, or under traditional names void of precise meaning by authors whose efforts have been checkmated by political boundaries hardly one hundred miles apart. This writer has good reason to believe that the botanists of Silesia have constantly recognized under certain binomials and trinomials the very same forms which the botanists of Czechoslovakia have constantly tagged with certain others. If it had occurred to French botanists to study carefully the plants of Austria, and to the Austrian botanists to investigate those of France, all these botanists would have realized that they were dealing in many cases with intimately related entities, and that the "species" of the moist Viennese meadows, although separated from the "species"

of South-Western France by the intervening highlands of Switzerland, could not be treated wholly as different. Obviously, the burden of nomenclature in the "Esula" group is overwhelming, and only an accomplished linguist may hope to probe its surface. Surface is a fitting term, because, with the destruction of the herbarium of Berlin already an accomplished fact, and other European herbaria threatened with a like fate, only masses of uncertain names unsupported by specimens are left of much of the work of the past. All of these names, on the other hand, may not be dismissed as unimportant. As Jordan first proved in his classic paper (in Billot, Annot. Fl. France Allem. 23-32. 1855), and this writer well knows, many forms of the "Esula" affinity are true to seed, and worthy at least of trinomials. The broken-down threads of this classification will eventually have to be picked up one by one, and topotypes carefully studied to substitute for destroyed or other lost type-specimens.

In order to understand the shifting habit and the uncertain morphology of the "Esula" group, it is advantageous to realize that in all forms living as hemicryptophytes (see for an illustration, Hegi Ill. Fl. Mit.-Eur. 5(1):179 fig. 1788. 1924) the rhizome, strictly speaking, is the significant part of the plant. From it arise above ground two kinds of stems. The first is characteristic of springtime, and consists almost exclusively of floristic shoots, that is, of axes in which the umbel and its modified bracts or leaves predominate. The second essentially belong to the summer, and is dominated by the appearance of sterile shoots in which the umbel takes second place, and the foliage plays first part. These two cycles of growth have a physiological basis. Arny found (in Minn. Agr. Exp. Sta. Techn. Bull. 84. 1932, cited by Bakke in op. cit. 239), that the total of readily available carbohydrates in the spurge of the "Esula" complex, reaches the low point for the season in the middle of May, increasing at a variable rate thereafter. Accordingly, it is clear that the spring growth draws heavily on the reserves accumulated during the preceding summer, and is followed in turn by a summer growth, the main function of which is to replenish these reserves. Such a metabolism is readily influenced by climatic and edaphic factors, and it may be suspected that it has played a material role in evolving the baffling and very numerous forms which constitute the "Esula" world. Naturally, it often proves impossible in this group to make critical determinations on the strength of indifferent specimens. Satisfactory material must include spring and summer growth, ripe capsules and seeds, and experimental cultivation must be resorted to in doubtful cases.

In the absence of dependable taxonomic characters identification of these difficult forms by means of available keys and elaborate descriptions is in most cases unsuccessful. For instance, the nectaries to the cyathium have occupied many taxonomists but are unreliable. The findings of Bakke (in op. cit. 220 fig. 7), who set out to test the validity of Morton's key based upon presumed differences in the nectaries of *E. Esula* L. and *E. virgata* Wald. & Kit. may be cited in this connection. He found that these organs "varied considerably, even in the same plant," and illustrated not less than a dozen of their variations. So wide a range of variability will not surprise a botanist who is aware



Lamarck never published an *E. mauritanica* of his own (Enc. Méth. 2: 418. 1788), but definitely referred to "Euphorbe de Mauritanie, *Euphorbia Mauritanica* Dill. Elth. 384 t. 289. f. 373," together with other synonyms not incompatible with Dillenius's *Tithymalus*. On the face of the publication, the plants of Linnaeus and Lamarck are the same.

The Linnean publication of *E. mauritanica* (Sp. Pl. 1:452. 1753) reads as follows: "[*Euphorbia*] *mauritanica*. 10. EUPHORBIA inermis seminuda fruticosa filiformis flaccida, foliis alternis. Hort. cliff. 197. Hort ups. 140. Roy. lugdb. 195. Diss. euph. 10\* *Tithymalus aphyllus mauritanica* Dill. elth. 384 t. 289 & 373. Habitat in Africae maritimis."

Like every other publication intended to cover a succulent or nearly succulent spurge, the Linnean presentation of *E. mauritanica* is hazy and over inclusive. The references, directly and indirectly, involve poorly known entities, long cultivated in European gardens, characterized on the whole by succulent or nearly succulent green or gray branches, caducous small or minute leaves, seldom if ever seen in flower. Clearly, *E. mauritanica* so conceived by its maker may involve even non-euphorbiaceous plants, such as *Sarcostemma* R. Brown of the Asclepiadaceae, a species of which, *S. viminalis* R. Br., was long accepted as *Euphorbia viminalis* L.

Since no specimen is extant in the Linnean herbarium (Jackson, Ind. Linn. Herb. 74. 1912), *E. mauritanica* L. is based upon the diagnostic note of the original publication, and at least one of its synonyms, which is the lectotype. As usual, Crantz (Inst. Rei Herb. 2:455. 1766) supplies the lectotype, exclusively referring under *E. mauritanica* L. to Dillenius' *Tithymalus aphyllus mauritanica*, Hort. Elth. 2:384 pl. 289 fig. 373. 1732. Crantz's selection is confirmed in the Haak edition of the Hortus Elthamensis, published in Leyden in 1774, which uses the original copper plates, but includes in addition an unpaged appendix of Linnean binomials referred to the plates of Dillenius.

Under the circumstances, Dillenius' figure is the type of *E. mauritanica* L. It is next to impossible to deny that Dillenius' carefully illustrated plant is the species known to modern taxonomists as *E. obtusifolia* Poir., and Crantz's choice of a type is hardly open to challenge, for Dillenius' *Tithymalus* is the lone meaningful reference given by Linnaeus in the publication of *E. mauritanica*. *E. obtusifolia* Poir. (represented in the herbarium of the Arnold Arboretum by Bornmüller 2862, Canary Isl., La Palma) is accordingly entitled to the name of *E. mauritanica* L.

However, the Linnean binomial has by now become attached to another and very different entity, the so called *E. mauritanica* L. of South Africa dealt with by N. E. Brown (in Dyer's Fl. Cap. 5(2):291. 1915), and recently illustrated (in Fl. Plts. South Afr. 14: pl. 529. 1934) with reference to Specimen No. 10839 in the National Herbarium of Pretoria, South Africa. This misapplication appears to have begun at an early date, and by now has become current.

Poiret (in Enc. Méth. Suppl. 2:609. 1811), Webb & Bertholet (Hist. Nat. Canar. 3(2):251. 1836-1850), and Boissier (in DC. Prodr. 15(2):94.

1862) affirm, having seen authentic material, that *E. virgata* Desf. is identical with *E. obtusifolia* Poir., which is definitely later in date of publication. If so, *E. virgata* Desf. takes precedence over *E. obtusifolia* Poir., so far as it has been suggested to this writer by a hasty review of the literature. However, *E. mauritanica* L., too, based upon Dillenius' *Tithymalus*, is *E. obtusifolia* Poir., so that Desfontaines erred in necessarily assuming Lamarck to have been victim of a misinterpretation of the Linnean entity. Desfontaines' *E. virgata*, consequently, may be in the last analysis an illegitimate renaming (*synonyme de nomenclature*) of Linnaeus's and Lamarck's *E. mauritanica*.

The plant known to modern botanists as *E. obtusifolia* is closely related to *E. Regis-Jubae* Webb & Berth. and to *E. balsamifera* Ait., and the specimen of *E. mauritanica* which this writer saw in the herbarium of Lamarck at the Paris Museum in 1939 impressed him as having been collected from a cultivated plant of the former. If the writer be right, and Lamarck's specimen is indeed *E. Regis-Jubae*, rather than *E. obtusifolia* the Linnean *E. mauritanica* being *E. obtusifolia*, it follows that *E. virgata* is a *nomen nudum* or *nomen subnudum*, which Desfontaines misapplied with reference to the Lamarckian listing of *E. mauritanica*, and probably has in reality the status of a taxonomic synonym (*synonym on taxonomic grounds*) of *E. mauritanica* of Linnaeus. It might be argued that *E. virgata* is an illegitimate renaming, too, of *E. mauritanica* of Linnaeus, but arguments to this effect would hardly be worthy of attention. Let it be noticed that *E. virgata* Desf. is typified exclusively by the specimen extant in Desfontaines' herbarium.

As this writer has pointed out, the binomial *E. mauritanica* L. is widely though erroneously employed. Assuming that *E. mauritanica* L. is the South African plant exemplified by *Specimen No. 10839* at Pretoria, that the Lamarckian specimen of *E. mauritanica* L. is *E. Regis-Jubae*, and that Desfontaines' plant is *E. obtusifolia* Poir., *E. virgata* Desf. becomes a straight *nomen nudum* (possibly *subnudum* on account of the fact that the locality of origin and the nature of the growth is indicated by Desfontaines), misapplied to the Lamarckian entity. Such a name is invalidly published.

According to Weatherby (Madroño 7:83-84. 1943), a name invalidly published may be duplicated by a later one, while a name which is illegitimate cannot be so duplicated. This being the case, *E. virgata* Desf., 1804, does not automatically exclude *E. virgata* Wald. & Kit., 1805. Anybody who, like this writer, accepts *E. mauritanica* L. as now understood, believes that *E. mauritanica* of Lamarck is *E. Regis-Jubae* Webb & Berth. (a most plausible belief), and is not inclined to question Poiret's, Webb & Berthelot's and Boissier's statements that *E. virgata* Desf. is identical with *E. obtusifolia* Poir., must conclude that *E. virgata* Desf., 1804, being invalidly published (*nomen nudum* or *subnudum* misapplied at publication) can be duplicated by *E. virgata* Wald. & Kit. Such a conclusion is perfectly in line with Wheeler's belief (in *Rhodora* 40:318-320. 1938) that *Thalictrum polycarpum* S. Wats. is tenable, being antedated only by the invalidly published *T. polycarpum* Lor., but conflicts with the opinion of the same author (in *Contr. Gray Herb.* 127:66. 1939) to the effect that *E. virgata* Wald. & Kit. is objectionable.



The ill advised wording of Art. 61 in the current Rules, which makes homonymy dependent upon the fact whether an earlier name has been "validly" published or not, may offer a temporary, not unwelcome relief in the case of *E. virgata*, but leaves wholly unsettled countless other issues, involving the legion of names of doubtful validity (*nomina subnuda*, *nomina abortiva*, *hyponyms*). Since the rejection of Waldstein & Kitaibel's binomial entails far reaching consequences, none of which should be tackled in haste, and Art. 61 in the current Rules makes it possible to treat it in any way one likes, this writer is satisfied for the present to allow the matter to rest with certain limitations. Accordingly, *E. virgata* Wald. & Kit. is here accepted.

### Taxonomic Treatment

This treatment is based only upon specimens belonging to the Arnold Arboretum (AA) and the Gray Herbarium (GH) of Harvard University, with an occasional citation of material from the herbarium of the New England Botanical Club (NE), kept at the Gray Herbarium, and contains an informative synonymy.

The entities dealt with already belong to our adventitious flora, or are likely to appear as ballast plants or weeds.

Certain species of the "Esula" group were identified in the past by this author with combinations in manuscript based on the belief—prior to his own investigation—that *E. virgata* Wald. & Kit. was necessarily preoccupied. These identifications and combinations should now be disregarded, in favor of the present treatment.

*EUPHORBIA ESULA* L. Sp. Pl. 1:461. 1753; Boiss. in DC. Prodr. 15 (2): 160. 1862, *saltem p. p. typica*.

European material seen: Linnean holotype (photograph, AA); *Genty s.n.*, France, Côte-d'Or; Auxonne (AA); *Lademann s.n.*, Germany, Brandenburg; Güben (AA); *Danke Parchin s.n.*, Germany, Mecklenburg; Dömitz (AA).

American material seen: none.

The most characteristic form of *E. Esula* L., *sensu acriore*, is apparently represented by *E. Esula mosana*, *sensu* Boiss. (in op. cit. 161). This form (*Genty s. n.*) is luxuriant, comparatively lax in habit, and bears oblong leaves much broadened as a rule at the middle or at the upper third. Its habitat is mostly restricted to moist, rich soils in Belgium and Western France. The German plant, exemplified by *Lademann s.n.*, *Danke Parchin s.n.*, answers Boissier's concept of *E. Esula genuina*, and, to the extent that it may be judged from a photograph, fully agrees with the single floriferous stem which is the Linnean holotype. To all appearances, depauperate specimens of this entity are the base of *E. Esula* subsp. *pinifolia* (Lam.) Hegi (in Ill. Fl. Mitt.-Eur. 5 (1): 171. 1924).

It is hardly surprising that a plant which, like *E. Esula*, prefers moist and fairly cool habitat should not be found adventitious in the states on the Atlantic seaboard and in the Midwest. A perennial favoring inland watercourses and grassy parklands, as a rule, is not apt to gain as wide a distribution as an



alien plant inhabiting drier region, with extremes of temperature. Granted that *E. Esula* might yet be found in narrowly localized colonies in favored localities of the United States, and could almost certainly become naturalized in parts of Washington, Oregon and British Columbia, the fact remains that this writer has never seen adventitious specimens of it. Morton is apparently correct (in *Rhodora* 39:50. 1937) in concluding that none of the specimens he saw may properly be said to belong to the Linnean species.

It is often believed that the leaves of *E. Esula* are usually subserrulate near the apex, and this character (see Morton, loc. cit., for instance) is introduced in keys. This character is not to be accepted without qualification. The leaves of the species in the "Esula" affinity are not serrulate, but the translucent thin margin which surrounds the blade may be eroded at the tip in leaves which are dilated at the middle or the upper third. Leaves of this pattern are typical of *E. Esula*, but even on them the margin may be entire at times.

*EUPHORBIA VIRGATA* Wald. & Kit. Ic. Descr. Pl. Rar. Hung. 2:176 pl. 162. 1805; Boiss. in DC. Prodr. 15 (2):159. 1862. *Non Desfontaines* 1804.

European material seen: *Halácsy* 962, Austria, near Vienna (AA).

American material seen: *Croizat* s.n. 1942, 1943 (cultivated plants). (AA).

The epithet *virgata* is most appropriate. The springtime growth consists of single, strict, slender shoots, scarcely over 2 feet tall, followed in the summer by comparatively few shoots with linear leaves. This species is characteristic of the Pontian-Pannonic flora, and easily recognizable in life, especially in the spring. In herbarium specimens summer growth of *E. virgata* is hardly separable from summer growth of depauperate forms of *E. intercedens*. The writer has seen only two specimens which might belong here, both from Boston, *Faxon* s.n. 1878 (GH), and *Young* s.n., 1879 (NE), this suggesting that *E. virgata* is in this country, essentially a ballast-plant. Morton's belief (in *Rhodora* 39:50. 1937) that *E. Esula* of the Midwest is Waldstein & Kitabel's species does not seem to be well founded to this writer, for the plant in question is *E. intercedens*.

*EUPHORBIA VIRGATA ORIENTALIS* Boiss. in DC. Prodr. 15 (2):160. 1862; Fl. Orient. 4:1126. 1879; Hayek, Prodr. Fl. Balc. 1:131. 1924.

Eurasian material seen: *Bourgeau* 243, Armenia (GH); *Adamovic* s.n. 1895, 1896, Serbia (AA); *Rubizova* s.n. 1933, Russia, Transcaucasia (GH.)

American material seen: *Eames* 5050, 5051, 5051 b 1904, 1906 Connecticut: Norwalk (GH, NE); *Wheaterby* 5385, Connecticut: Harwinton, 1925 (NE).

This is a new record for our flora, definitely established by the fact that the *Adamovic* collection so closely matches the *Wheaterby* collection as to suggest to a casual observer that all these specimens belong to the same number.

*Euphorbia virgata orientalis* is much taller and stouter than typical *E. virgata*, and probably falls within the limits of Boissier's *E. iberica*, endemic in the Caucasus.

This writer has seen (AA) an authentic specimen of *E. virgata* var.

*Kneuckeri* W. Zimmerm. in Hegi (Ill. Fl. Mitt.-Eur. 5(1):175. 1924). The classic locality is Karlsruhe in Baden, Germany. This variety can be extricated with much difficulty from *E. virgata orientalis*, and if not adventitious at the locality, may well happen to represent the extreme western limit of dispersal of the Balkan and Caucasian aggregate. Bavaria, as a matter of fact, is well known as the westernmost range of *Tilia dasystyla* Stev., which has its center of distribution in the Caucasus and in Greece.

*EUPHORBIA VIRGATA MONTANA* Reich. Ic. Fl. Germ. Helv. 5:8 fig. 4792. 1841; Boiss. in DC. Prodr. 15(2):160. 1862.

*Euphorbia Tommasiniana* Bertol. Fl. Ital. 5:78. 1842.

European material seen: *Marchesetti* 53, 1724. Trieste: Monte Spaccato (GH).

American material seen: none.

A significant specimen (GH) is *Pichler s.n.*, which appears to have been collected at Ruschuk, Bulgaria, the locality being added to a label printed to cover material originating in Asia Minor. The match between the plant of *Pichler* and the *Marchesetti* collections, coming from the type-locality, is perfect.

*Euphorbia virgata montana* bears a close resemblance to *E. campestris* Cham. & Schlecht., endemic to Texas and Mexico. So far, it has been reported only from Monte Spaccato, in a region of the northern Adriatic famous for its endemism. The *Pichler* collection, whether it be from Bulgaria or Asia Minor, radically alters our understanding of this variety's range. This plant may appear as ballast.

*EUPHORBIA INTERCEDENS* Podp. in Publ. Fac. Sc. Univ. Masaryk, 12:29: 1922; Domin Pl. Cecosl. Enum. 77. 1935.

European material seen: *Otruba s.n.* 1929, Czechoslovakia, Olomouc: Grygov (isotype); *Laus s.n.*, same locality; *Podpera & Unzeitig* 1014, Moravia and Slovakia; *Weber s.n.*, Skalica (all AA).

American material seen: *E. J. Palmer* 46288, 1942, Massachusetts: Newbury, Devil's Den, old lime quarry; *Croizat s.n.* 1942, 1943 (cultivated plants) (All AA).

The *Palmer* collection is beyond question a full match of the specimens cited from Czechoslovakia, and of the material grown by the writer from seed originally secured from the Botanic Garden of Praha. This *Spurge* is probably the base of every old record of *E. Esula* in North America, and might have been introduced in colonial times. So far as this writer knows, it is the *E. Esula* and the *E. virgata* now naturalized and aggressively spreading in the Midwest, and listed in all references of American flora.

*Euphorbia intercedens* would not be accepted as a full fledged species in the classification of Clausen, Keck & Hiesey (in Amer. Jour. Bot. 26:103-106. 1939), but, this writer believes, merely as a subspecies (*ecotype*) of the cenospecies *E. virgata*, this, once again in this writer's opinion, being distinct from the cenospecies *E. Esula* by edaphic preferences, range, and sums of intangibles which nearly all taxonomists have duly recognized; biotypic concepts and distributional factors are a live, essential part of the taxonomy of the "Esula" group. *Euphorbia intercedens* may be summarily described as a

much stouter and taller form than the typical aspect of *E. virgata*, which it otherwise resembles. Luxuriant summer growth of *E. intercedens* may easily be confused with specimens of *E. Esula*, but the species of Podpera is often reported from dry, stony grounds in association with graminaceous plants, an habitat which *E. Esula* could hardly withstand, especially during the climatic excesses of summer and winter.

It seems possible that *E. intercedens* is antedated by *E. pseudolucida* Schur (in Siebenbürg. Ver. Naturwiss. Verhandl. Mittheil. 3:123. 1852), the type-description of which suggests many of the characters of Podpera's entity. This writer, as a matter of fact, has used Schur's binomial on specimens of this plant, anticipating a study of Schur's authentic material. Since now it is by no means certain that the herbaria of Central Europe will survive the ravages of the present war, to which the herbarium of Berlin has already fallen victim, it seems advisable to retain Podpera's binomial. In this affinity, a specimen is worth any amount of description, and full use should be made of the isotype of *E. intercedens* in an American herbarium.

The material which best illustrates the basic differences among *E. Esula*, *E. virgata* and *E. intercedens* is constituted by single floriferous shoots of springtime growth, both in early anthesis and fruit. The characteristic foliage of *E. Esula*, broadened at the middle or at the upper third, usually yellow- or deep-green, stands out well on such material against the depauperate-looking shoots of *E. virgata*, with thin, sublinear leaves, and the stems of *E. intercedens* capped by comparatively large and many-rayed umbels, and bearing leaves which are linear-oblong throughout. Live plants of *E. intercedens* and *E. virgata*, especially during the summer, tend to have a glaucescent cast.

Both the plant illustrated by Reichenbach (Ic. Fl. Germ. 5: pl. 147 fig. 4792. 1841) as *E. virgata*, and that shown by Hegi (Ill. Fl. Mitt.-Eur. 5(1): 170 fig. 1779. 1924) as *E. Esula* impress this writer as *E. intercedens*.

*Euphorbia virgata* forma *esulifolia* Thell. in Hegi (op. cit. 175) is not known to this writer from actual material, and its description is wholly unrevealing. Morton indorses it (in *Rhodora* 39:50. 1937) with comments that suggest his having in mind *E. intercedens*.

EUPHORBIA URALENSIS Fisch. ex Link En. Pl. Hort. Berol. 2:136. 1822; Serg. in Krylov Fl. Sibir. Occid. 8:1876. 1935.

*Tithymalus uralensis* Prokh. Consp. Syst. Asiae Med. 203. fig. 68. 1935.

Eurasian specimens seen: Grigoriev 19, Caucasus: Baku (AA); Sokolova s.n., Caucasus: Kuban (AA); Pojarikova 89, Ural; Bukeevsk (GH); Becker 642, Eastern Russia: Sarepta (GH.)

The limits of this species, in reality a probable ecotype of *E. virgata* in the sense of Clausen, Keck & Hiesey, confined to the steppes of Eastern Russia and adjacent Western Asia, are much obscured by controversial trinomial. The form which this writer has seen, and well agrees with Prokhanov's figure,

has long linear leaves reminiscent of the typical form of *E. virgata*, comparatively ill developed umbels, and stems that may attain a height of 3 feet.

Dodge s.n., 1889, Michigan: Port Huron (GH) might belong here, if it is not an aberrant specimen of *E. intercedens*. The locality of collection suggests a ballast-plant.

EUPHORBIA AGRARIA M.-a-B. Fl. Taur.-Cauc. 1:375. 1808; op. cit., Suppl., 3:326. 1819; Reich. Ic. Pl. Rar. 3: pl. 251 fig. 413. 1825; Boiss. in DC. Prodr. 15(2):163. 1862; Hayek Prodr. Fl. Pen. Balc. 1:132. 1924.

Eurasian material seen: Boissier s.n., Mt. Mesogis (AA); Busch & Klopotov s.n. 1907-1908, Caucasia: Kuban (AA); Afinkiev s.n., 1888, Caucasia: Sultanovskaia (AA).

American material seen: Millspaugh s.n. 1885-1886, New York: Vestal (GH); Millspaugh s.n. 1890, New York: Waverly (GH); Clute s.n. 1896, New York: Binghamton (GH).

This is a new record for the American flora, and is the plant which Norton (in Missouri Bot. Gard. Rept. 11:137. pl. 52. 1900) has misinterpreted as *E. lucida*. As usual with this affinity, large sets of specimens tend to bring together two or more species, more or less sharply distinct intergrades eventually connecting the endemics of Europe with those of the Caucasus and Asia in general. It may not be doubted that if *E. lucida* and *E. agraria* ultimately intergrade, the plants adventitious in New York still belong to the latter on account of their broad leaves, clasping at the base. This writer follows Boissier, and the totality of European authors, in maintaining *E. lucida* and *E. agraria* distinct, at least for the purposes of this preliminary treatment.

EUPHORBIA LUCIDA Wald. & Kit. Ic. Descr. Pl. Rar. Hung. 1:54 pl. 54. 1802; Boiss. in DC. Prodr. 15(2):163. 1862, *saltem p.p. typica*.

European material seen: Laus s.n., Czechoslovakia, Olomouc; Auspitz (AA) Matz s.n., Lower Austria (GH).

American material seen: Groh s.n., 1933, Canada, Alta.: Edgerton (GH).

The Groh collection is the lone certain record of *E. lucida* known to the writer in North America thus far. Hegi's purported illustrations of *E. virgata* (Ill. Fl. Mit.-Eur. 5(1):174, 175 fig. 1782, 1873. 1924) are excellent iconography of *E. lucida*, which will be immediately apparent to anyone who compares them with Waldstein & Kitaibel's classic plate. Specimens like Randolph 2, New York: Binghamton (GH), and Muenschner, Wilson & Foster 15741, New York: Vestal (GH) have leaves at the stem not definitely clasping, which suggests transition between *E. lucida* (leaves not clasping) and *E. agraria* (leaves clasping). Binghamton and Vestal are well known localities for *E. agraria* in the United States.

EUPHORBIA CYPARISSIAS L. Sp. Pl. 1:461. 1753; Boiss. in DC. Prodr. 15(2):160. 1862; Norton in Missouri Bot. Gard. Rept. 11: 134 pl. 50. 1900.

This is a well known perennial, frequently cultivated and adventitious, and correctly recognized in nearly all American herbaria. Nothing better illustrates

the endless intergrading connecting the extreme forms of the "Esula" affinity than the existence of specimens which merge *E. Esula* and *E. Cyparissias* at least in herbarium, witness: *Genty s.n.*, France, Côte-d'Or: Velars (AA); *Polonskaia s.n.*, Russia: Kiev (AA); *Gerasimova s.n.*, same locality (AA); *Gérard 3585*, France: Auxonne, (*E. pseudocyparissias* Jord.) (GH); *Schultz 4*, Germany: Zweibruecken (GH); *Danke-Parchin*, Germany: Dömitz (AA). It is interesting to record this fact, for *E. Esula* and *E. Cyparissias* are exceedingly well characterized in their extreme forms, so much that no botanist has ever dared to suggest that only one species is involved in this galaxy.

*EUPHORBIA HEBECARPA* Boiss. Diagn. Pl. Orient. 7:90. 1846; in DC. Prodr. 15 (2):160. 1862; Fl. Orient. 4:1126. 1879.

*Euphorbia salicifolia angustata* Roch. Pl. Pl. Ban. Rar. 43 pl. 7 fig. 16. 1828, excl. syn. Syn. Nov.

*Euphorbia Esula pubescens* Griseb. in Wieg. Arch. 18:297. 1852. Syn. Nov.

*Euphorbia paradoxa* Borb. Balaton Tavának 406. 1900. Syn. Nov.

Eurasian material seen: *Kotschy 567*, Asia Minor (isotype of *E. hebecarpa*, AA); *Kotschy s.n.*, Kurdistan (AA); *Barth s.n.*, Transylvania (AA); *Simkovic 505*, Hungary: Arad (GH); *Nyárády & Bujorean 438*: Transylvania (GH).

American material seen: none.

The writer cannot extricate the Romanian and Hungarian specimens cited from classic material of Asia Minor, and believes, once more, that the plants of Asia, the Balkans and Central Europe are fully conspecific. The description indicates that *T. jaxarticus* Prokh., Consp. Syst. Tithym. Asiae Med. 192 fig. 66. 1933, also belongs here.

This peculiar species is well characterized by its pubescence, and may easily appear as a strictly localized adventitious plant in this country. It has been in cultivation in some of our botanical gardens, according to accounts orally made to this writer.

*EUPHORBIA SALICIFOLIA* Host Syn. Fl. Austr. 267. 1797; Fl. Austr. 2: 567. 1831; Wald. & Kit. Ic. Descr. Pl. Rar. Hung. 1:55 pl. 55. 1802; Hegi Ill. Fl. Mitt.-Eur. 5 (1):166 fig. 1775. 1924.

This species suggests at a glance a pubescent state of *E. lucida*, and bears to *E. hebecarpa*, as it might be suspected, a relationship analogous to that connecting *E. virgata* with *E. intercedens*. The writer has not seen it collected in this country, but from seed received from the Botanical Garden of Cluj, Romania, in 1938, he started a colony of it in the grounds of the Bussey Institution of Harvard University, specimens from which have been made (AA). *Euphorbia salicifolia* is not without ornamental merits, but should not be propagated. It is an extraordinarily aggressive perennial with all the earmarks of a potentially pestiferous weed.

According to Norton (in Missouri Bot. Gard. Rept. 11: 139. 1900), *E. Paralias* L. has once appeared at Philadelphia. This exceedingly characteristic

halophyte is not apt to persist at the locality, for it dwells in comparatively mild climatic surroundings along the shores of the Mediterranean and the European Atlantic Ocean. It might be found further south, fully naturalized. *Euphorbia Terracina* L. in the sense of Boissier (in DC. Prodr. 15(2):157. 1862) and *E. segetalis* L. in all their numerous forms may also occur in the United States, but would suggest *E. Esula* or *E. virgata* only to botanists wholly unacquainted with the "Esula" affinity.

### Summary

This study reviews the adventitious noxious weed known to American agronomists and taxonomists as *Euphorbia Esula* L. and *E. virgata* Wald. & Kit. It contains a brief account of the "Esula" question, a critical study of the nomenclatorial position of *E. virgata* Wald. & Kit., and notes of detail concerning *E. Esula* L., *E. virgata* Wald. & Kit., *E. virgata orientalis* Boiss., *E. virgata montana* Reich., *E. intercedens* Podp., *E. uralensis* Link., *E. agraria* M.-a-B., *E. lucida* Wald. & Kit., *E. Cyparissias* L., *E. hebecarpa* Boiss. and *E. salicifolia* Host. Specimens available in American herbaria, and authenticated by the writer, are listed for each binomial. Two new records are established for our adventitious flora, *E. virgata orientalis* Boiss. and *E. agraria* M.-a-B. The opinion is voiced that the great majority, if not the totality, of the plants known to American agronomists and taxonomists as *E. Esula* L. or *E. virgata* Wald. & Kit. are in reality *E. intercedens* Podpera. The legitimacy of *E. virgata* Wald. & Kit., 1805, at least *pro tempore*, is affirmed against the previous publication of *E. virgata* Desf., 1804.

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## The Goldenrods of Minnesota: A Floristic Study

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In his catalogue of the Flora of Minnesota, published in 1884, Warren Upham recorded 21 species and 7 varieties of goldenrods for the state. In addition, he cited one species and one variety as probably occurring in northeastern Minnesota. The report was based on the work of the Geological and Natural History Survey, which had then been in operation for a dozen years, and on data supplied by a number of contemporary amateur botanists and collectors. The author also included a number of species cited in previously published lists, some of which dated back to the reports of territorial expeditions many years before.

The general tendency of compilers of local floras to admit species on insufficient evidence is manifest in Upham's report, for despite all the botanizing which has since been done in all parts of the state nine of the species which he recorded have not turned up, and it seems highly probable that none of them will be found to occur. The errors were clearly due to misidentifications, and it should be noted that nearly all the mistakes are contained in the citations taken from the earlier lists.

Since the publication of Upham's catalogue, a great deal of material of *Solidago* has been accumulated in the University of Minnesota herbarium. In the absence of a thorough and critical review, the collection became rather unsatisfactory either as a record of distribution or as an aid in identification. Building upon recent taxonomic and nomenclatural studies by M. L. Fernald and others, the present writers have attempted to ascertain what species and varieties of goldenrods occur in the state, and to present a treatment to facilitate their identification. Our basis for admitting species into the goldenrod flora of the state is the presence of specimens in the University of Minnesota herbarium. Records published in old reports are disregarded, since many of these are known to be based on misidentifications. Current interpretations of the application of names have been accepted, and no effort has been made to see the types, in most cases, except as these were readily available. Nomenclatural and taxonomic changes are made only where obviously necessary. We wish to thank Dr. M. L. Fernald for the loan of the type and other specimens of *Solidago hispida* var. *arnoglossa*.

The senior author contributes critical advice and observations based on his field experience of many years with the local goldenrods; the junior author contributes the detailed work of comparing specimens and drawing up the preliminary report. The authors assume joint responsibility for the completed paper.

There are three regional types of vegetation in Minnesota. Approximately one third of the northeastern and northern part of the state is the region of the coniferous forest climax. The southern and western part of the state is



grassland, while between the two is a strip of variable width in which the deciduous forest constitutes the climax. Before settlement the boundary between the deciduous forest and the grassland was rather sharply defined, although very sinuous throughout most of its extent. Besides the areas of grassland penetrating into the forest, there are isolated patches of prairie well within the hardwood belt and occasionally even within the southern part of the coniferous forest. The distribution within the state of the various species of *Solidago* is closely correlated with the primary vegetation regions, and a number of the prairie goldenrods occur in the outlying prairie islands. In the southeastern part of the state, which was and still is fairly well forested, the steep slopes of the south- and west-facing bluffs of the deeply eroded river valleys present prairie conditions, and there too typical prairie goldenrods occur.

## KEY

1. Inflorescence corymbiform or subcapitate; heads sessile, or if pedicellate, then the phyllaries, or some of them, more or less longitudinally striate.
2. Heads sessile; phyllaries not striate.
  3. Leaves strongly punctate, 1-nerved or indistinctly 3-nerved, the single pair of lateral nerves faint and inconspicuous, or absent; heads narrowly obconic; involucre mostly 5-6 mm. high. ....19. *S. gymnospermoides*
  3. Leaves sparsely or moderately punctate, distinctly 3-nerved, the larger ones almost always with one or two additional pairs of faint lateral nerves; heads broader, with more numerous florets; involucre mostly 4-5 mm. high. ....18. *S. graminifolia*
  4. Middle cauline leaves mostly 7-10 times as long as wide, merely acute. ....18b. var. *major*
  4. Middle cauline leaves at least 11 times as long as wide, acuminate. ....18a. var. *typica*
2. Heads pedicellate; phyllaries more or less striate.
  3. Leaves glabrous except for the ciliate margins, narrow, the middle cauline ones at least 10 times as long as wide; phyllaries obscurely striate. ....17. *S. Riddellii*
  3. Leaves pubescent on both sides, broad, the middle cauline ones not more than 6 times as long as wide; phyllaries obviously striate. ....16. *S. rigida*
1. Inflorescence various, from axillary to thyrsoid to paniculiform, but not corymbiform or subcapitate; heads pedicellate; phyllaries not striate.
  2. Heads either in axillary clusters or in a simple or branched thyrses, the branches not at all recurved-second, the top straight, not nodding.
    3. Stem and leaves uniformly canescent with short spreading hairs; leaves broad, triple-nerved. ....6. *S. mollis*
    3. Stem and leaves glabrous or more or less hirsute, but not uniformly canescent with short spreading hairs; leaves various in shape, but not triple-nerved.
      4. Lowermost leaves present at flowering time 7-15 times as long as wide; basal and lower cauline leaves very large and conspicuous, some of them nearly always persistent until flowering time; leaves glabrous on both surfaces; plants of bogs. ....5. *S. uliginosa*
      4. Lowermost leaves present at flowering time 2-6 times as long as wide; basal and lower cauline leaves sometimes very large and conspicuous, sometimes not, often deciduous before flowering time; leaves glabrous to densely pubescent; plants of uplands, not bogs.
  5. Middle cauline leaves sharply toothed, thin, ample, ovate or broader, abruptly acuminate, and usually abruptly short-petiolate, usually more or less hirsute on the lower surfaces; inflorescence usually of axillary clusters or racemiform branches, sometimes a terminal thyrses. ....1. *S. flexicaulis*

5. Middle cauline leaves entire or occasionally crenate-dentate (sometimes sharply toothed in *S. Randii*), usually acute and narrower than ovate, sometimes broader, glabrous or pubescent; heads usually borne in a terminal simple or branched thyrs, sometimes clustered in the axils of reduced upper leaves.
6. Leaves essentially glabrous; leaves thick and firm.
  7. Lower leaves toothed; akenes usually more or less strigose; involucre mostly 5-6 mm. high, rarely less. .... 3. *S. Randii*
  7. Lower leaves entire or occasionally slightly crenate-serrate; akenes glabrous; involucre mostly 3-5 mm. high, rarely more. .... 4. *S. speciosa*
  8. Leaves broad and ample, the middle cauline ones mostly over 2 cm. wide. .... 4a. var. *typica*
  8. Leaves relatively narrow, the middle cauline ones mostly 2 cm. wide or less. .... 4b. var. *rigidiuscula*
6. Leaves more or less pubescent. .... 2. *S. hispida*
  7. Leaves sparsely to very moderately hairy on the lower surfaces, sparsely hairy to glabrate above; plant often short, sometimes taller and fairly robust. .... 2b. var. *arnoglossa*
  7. Leaves moderately to densely hairy on the lower surfaces, moderately to rather sparsely hairy above; plant usually tall and robust, sometimes short. .... 2a. var. *typica*
2. Heads in a terminal paniculiform inflorescence with recurved-second branches, or the top of the inflorescence nodding.
3. Leaves very numerous and essentially uniform in shape, usually also nearly uniform in size, the lower ones only slightly larger than those above; basal and lowermost cauline leaves deciduous before flowering time; plant usually well over 6 dm. high, occasionally lower. .... 11. *S. gigantea*
5. Leaves glabrous except for the scabrous-ciliate margins. .... 11b. var. *leiophylla*
5. Leaves pubescent on the main veins beneath, or sparsely hairy over the surfaces. .... 11a. var. *gigantea*
4. Stem more or less pubescent below the inflorescence. .... 14. *S. altissima*
5. Lower surfaces of the leaves densely canescent with spreading hairs; stem densely pubescent. .... 15. *S. pruinosa*
6. Pubescence of the upper and lower leaf surfaces similar, the hairs of the upper surface nearly or quite as numerous as those of the lower surface, and at least half as long. .... 15. *S. pruinosa*
6. Pubescence of the upper leaf surface, at least of the middle cauline leaves, unlike that of the lower surface, the hairs much less abundant than those on the lower surface, and less than half as long. .... 14. *S. altissima*
5. Leaves pubescent on the midrib and main veins beneath, occasionally sparsely pubescent over the surface; stem sparsely pubescent. .... 12. *S. lepida* var. *fallax*
6. Involucre mostly 2-3 mm. high; phyllaries tending to be in about 4 series, the outermost ones mostly less than half as long as the inner; ligules (boiled) mostly 1-1.5 mm. long. .... 13. *S. canadensis*
3. Leaves neither excessively numerous nor essentially uniform in size and shape, the lower ones usually proportionately broader than those above, or at least a different shape, usually also obviously larger, the basal ones often long-petiolate; basal and lowermost cauline leaves often persistent, sometimes deciduous before flowering time; plant usually 6 dm. high or less (except in *S. ulmifolia*), occasionally a little taller.
4. Stem finely and uniformly short-pubescent nearly or quite to the base; leaves similarly but less obviously pubescent on both sides.

5. Leaves broad, obviously 3-ribbed, the middle cauline ones mostly 2-4 times as long as wide. ....6. *S. mollis*
5. Leaves relatively narrow, only obscurely if at all 3-ribbed, the middle cauline ones 5-10 times as long as wide. ....7. *S. nemoralis*
6. Involucre 3-4 mm. (occasionally 4.5 mm.) high; akenes sparsely to moderately hirtellous with short ascending-spreading somewhat viscid-appearing hairs. ....7a. var. *typica*
6. Involucre mostly 4.5 mm. high or more (occasionally only 4 mm.); akenes comparatively copiously pubescent with relatively long appressed or closely ascending white non-viscid hairs. ....7b. var. *decemflora*
4. Stem glabrous, or somewhat pubescent above the middle, rarely sparsely hirsute near the base in *S. ulmifolia*; leaves glabrous or hirsute on one or both surfaces, not finely and uniformly short-pubescent.
5. Leaves at the base of the inflorescence elliptical to broadly lanceolate or broader, mostly  $2\frac{1}{2}$ -5 times as long as wide; lower and middle cauline leaves sharply toothed below as well as above the middle; leaves usually hairy on the lower and sometimes also the upper surfaces, the middle cauline ones mostly 2 cm. wide or more. ....10. *S. ulmifolia*
5. Leaves at the base of the inflorescence linear or linear-lanceolate, at least 7 times as long as wide (sometimes wider in *S. missouriensis*); lower and middle cauline leaves toothed above the middle or entire; leaves glabrous or occasionally sparsely hairy on the lower surfaces, glabrous or hairy on the upper surfaces, the middle cauline ones less than 2 cm. wide.
6. Leaves obviously triple-nerved, somewhat rigid, essentially glabrous except for the sometimes scabrous-ciliate margins (sometimes some very inconspicuous fine short hairs less than 0.2 mm. long on the surfaces); leaf-margins smooth, or more commonly scabrous-ciliate except near the base, where smooth or very sparsely long-ciliate; basal leaves usually deciduous or withered by flowering time. ....9. *S. missouriensis*
7. Leaves narrow and rigid, the cauline ones usually all less than 1 cm. wide, the upper ones often bearing conspicuous fascicles of reduced leaves in their axils. ....9b. var. *fasciculata*
7. Leaves broader and less rigid, some of the lower cauline ones, at least, usually 1 cm. wide or more; fascicles in the axils of the upper leaves usually inconspicuous or absent. ....9a. var. *glaberrima*
6. Leaves only obscurely if at all triple-nerved, scarcely rigid, some of them usually with at least a few hairs on the upper surface, rarely a few hairs on the lower surface as well; basal leaves usually persistent, the petioles long-ciliate on the margins, at least near the base. ....8. *S. juncea*

### Catalogue and Comments

1. *SOLIDAGO FLEXICAULIS* L. Sp. Pl. 879. 1753.  
*S. latifolia* L. Sp. Pl. 879. 1753.

A characteristic woodland plant of the deciduous forest climax area; also found occasionally in the coniferous forest climax area, as far north as Lake County, chiefly in company with groves of poplar and other deciduous trees.

2. *SOLIDAGO HISPIDA* Muhl. ex Willd. Sp. Pl. 3: 2063. 1803.

This species was treated by Gray as a variety of *S. bicolor* L. (*S. bicolor* var. *concolor*), and, although most present day authors treat it as distinct,

some do so only grudgingly. One source of confusion is that the rays frequently or usually fade in drying, becoming light yellow or creamy, and are often indistinguishable from the dried rays of *S. bicolor*. The color distinction is applicable only in the field. More significant is the difference in the involucre. In *S. bicolor*, the involucre, except for the usually well defined light green tips of the phyllaries, has a whitish or light straw-colored cast. In *S. hispida* the involucre has a greenish or dark yellow-greenish cast, the green tips of the phyllaries present but not sharply defined. The heads in *S. hispida* average larger than in *S. bicolor*, and Deam says that those of the latter have fewer rays. Although the distribution of the two species is somewhat similar, it is very doubtful that the range of *S. bicolor* extends as far north-westward as Minnesota.

2a. *SOLIDAGO HISPIDA* Muhl. ex Willd. var. *TYPICA* Rosendahl & Cronquist, nom. nov.

*S. hispida* Muhl. ex Willd. Sp. Pl. 3:2063. 1803.

*S. bicolor* L. var. *concolor* T. & G. Fl. N. Am. 2:197. 1841.

Generally distributed throughout the coniferous forest climax area, and occasionally found farther south, as indicated by collections from Dakotah County, and along the St. Croix River near Stillwater. The field color of the St. Croix material is bright orange-yellow, while that of the northern material is light yellow. Since there is no other appreciable difference, and the color of the rays is not well preserved in herbarium material, it seems unwise to attempt any segregation of the two color forms.

2b. *SOLIDAGO HISPIDA* Muhl. ex Willd. var. *ARNOGLOSSA* Fern. Rhodora 17: 2. 1915.

Not uncommon in Cook, Lake, and St. Louis Counties, and extending into Carlton and Pine Counties; an outlying station in Houston County, in the south-eastern corner of the state. Distinguished only by the lesser amount of pubescence and often smaller size, this variety is very weakly defined. Since it is not found throughout the range of var. *typica*, and there seems to be at least a slight correlation between scantier pubescence and smaller size, it seems best for the present to allow it varietal status, as Fernald has done.

3. *SOLIDAGO RANDII* (Porter) Britton, Man. Fl. N. U.S. 937. 1901.

*S. Virgaurea* L. var. *Randii* Porter, Bull. Torrey Club 20:208. 1893.

Dry rocky soil and crevices on dolomite rocks; Houston, Fillmore, and Winona Counties, in southeastern Minnesota, and north to Taylor's Falls, Chisago County; common.

4. *SOLIDAGO SPECIOSA* Nutt. Gen. Am. 2: 160. 1818.

4a. *Solidago speciosa* Nutt. var. *typica* Rosendahl & Cronquist, nom. nov.

*S. speciosa* Nutt. Gen. Am. 2:160. 1818.

*S. speciosa* var. *angustata* T. & G. Fl. N. Am. 2:205. 1841.

Woodlands in southeastern Minnesota, as far north as Minneapolis. Not so common as the next variety.

4b. *SOLIDAGO SPECIOSA* Nutt. var. *RIGIDIUSCULA* T. & G. Fl. N. Am. 2: 205. 1841.

*S. rigidiuscula* Porter, Mem. Torrey Club 5:319. 1894.

*S. Chandonnetii* Steele, Contr. U. S. Nat. Herb. 16:222. 1913.

A common and characteristic prairie plant, occasionally found in the deciduous forest area. Depauperate forms of the typical variety are morphologically very similar, but grow with the normal robust plants of that variety, and apparently do not form a self-perpetuating natural population. The var. *rigidiuscula* on the other hand, seems more stable genetically, and is strongly correlated with geography. It is generally a little more rigid than the depauperate phase of var. *typica*.

5. *SOLIDAGO ULIGINOSA* Nutt. Journ. Acad. Philad. 7: 101. 1834.

Bogs; characteristic of the coniferous forest climax area, but occasionally found at least as far south as Goodhue County. Some of the more southern plants have some of the lower panicle branches slightly secund, thus seemingly approaching *S. uniligulata*, but are certainly not taxonomically separable.

6. *SOLIDAGO MOLLIS* Bartl. Ind. Sem. Hort. Goett. 5. 1836.

*S. nemoralis* Ait. var. *incana* A. Gray, Proc. Am. Acad. 17:197. 1882.

*S. nemoralis* Ait. var. *mollis* MacMillan, Metasp. Minn. Vall. 510. 1892.

Known in Minnesota only from prairies at the extreme western border, from Lincoln to Traverse County, where apparently abundant. This is a distinctive species, and need not be confused with anything else in the region.

7. *SOLIDAGO NEMORALIS* Ait. Hort. Kew. Ed. 1. 3: 213. 1789.

This species is usually keyed in the manuals as having the leaves 3-nerved. In our area, at least, the leaves are only very obscurely if at all 3-nerved.

7a. *Solidago nemoralis* Ait. var. *typica* Rosendahl & Cronquist, nom. nov.

*S. nemoralis* Ait. Hort. Kew. Ed. 1. 3: 213. 1789.

Found throughout the state, but most common in the coniferous and deciduous forest climax areas. The pubescence of this variety has a slightly sticky or viscid appearance, caused by minute glandular swellings near the bases of the hairs.

7b. *SOLIDAGO NEMORALIS* Ait. var. *DECEMFLORA* (DC.) Fern. Rhodora 38: 226. 1936.

*S. decemflora* DC. Prodr. 5:332. 1836.

*S. pulcherrima* A. Nels. Bull. Torrey Club 25:549. 1898.

*S. longipetiolata* Mack. & Bush. Trans. Acad. Sci. St. Louis 12:87. 1902.

*S. nemoralis* var. *longipetiolata* Palmer & Steyer. Rhodora 40:132. 1938.

Common in the prairie area, and occasionally in the deciduous forest climax area; apparently absent from the coniferous forest climax area. The pubescence of this variety mostly lacks the viscosity characteristic of var. *typica*. Although the lower stem leaves are alleged by authors to be relatively longer and narrower than in var. *typica*, this characteristic is variable in both entities, and in our region at least is not useful for their separation.

8. *SOLIDAGO JUNCEA* Ait. Hort. Kew. Ed. 1. 3: 213. 1789.

In Minnesota almost entirely confined to the region of the coniferous forest climax. No one of the characters listed as distinguishing *S. juncea* from *S. missouriensis* is entirely dependable, and some of the characters given do not hold in other regions. For example, some western varieties of *S. missouriensis* commonly have the basal leaves persistent instead of deciduous. In spite of the breaking down of the distinguishing characters, there need rarely be any serious question as to which of the two a given plant represents, and we feel that they should be retained as distinct species.

9. *SOLIDAGO MISSOURIENSIS* Nutt. Journ. Acad. Philad. 7: 32. 1834.

Characteristically a prairie plant in our range; we have no specimens from the coniferous forest climax area. Typical *S. missouriensis* does not occur in Minnesota, but study of a considerable series of specimens convinces us that our plants are not specifically separable.

9a. *Solidago missouriensis* Nutt. var. *glaberrima* (Martens) Rosendahl & Cronquist, comb. nov.

*S. glaberrima* Martens, Bull. Acad. Brux. 8:68. 1841.

This combination is listed in the Gray Card Index as having been made in 1895 by Rydberg (Contr. U. S. Nat. Herb. 3: 161). Rydberg's statement was:

"*S. missouriensis* Nutt. Journ. Acad. Philad. vii, 32 (1834).

"The original of *S. missouriensis* is the low form with a short crowded panicle, which was named by Gray variety *montana*. . . . The taller form with more spreading panicle, the *S. missouriensis* of Gray's Synoptical Flora, should have the name *S. missouriensis glaberrima*<sup>1</sup> if held as a distinct variety. The great variation in the species of *Solidago* is well known. If this variety is to be admitted, I am afraid that, in order to be consistent, we should be obliged to add one or two varieties to nearly every species in that genus. . . .

"<sup>1</sup>. *S. glaberrima* Martens, Bull. Acad. Brux. viii, 68, 1841."

*S. missouriensis* [var.] *glaberrima* was obviously a provisional name. That Rydberg, then in his younger and more conservative days, did not regard var. *glaberrima* as valid is obvious not only from his comments, but also from the fact that he treated it under the bold face heading *S. missouriensis*. The varieties that he accepted were given separate bold face headings, as indicated on the very next page, where he proposed *S. canadensis* var. *gilyocanescens*,

in bold face. We therefore propose *S. missouriensis* var. *glaberrima* as a new combination.

9b. *SOLIDAGO MISSOURIENSIS* Nutt. var. *FASCICULATA* Holz. Contr. U. S. Nat. Herb. 1: 208. 1892.

*S. moritura* Steele, Contr. U. S. Nat. Herb. 13:370. 1911.

*S. glaberrima* Martens var. *moritura* Palmer & Steyerl. *Rhodora* 40:133. 1938.

About as common in Minnesota as var. *glaberrima*, and certainly not specifically separable from it.

10. *SOLIDAGO ULMIFOLIA* Muhl. ex Willd. Sp. Pl. 3: 2060. 1803.

Confined to the southeastern part of the state, extending up the valley of the St. Croix River as far as Taylor's Falls, Chisago County. Neither rare nor very common.

11. *SOLIDAGO GIGANTEA* Ait. Hort. Kew. Ed. 1. 3:211. 1789.

Both varieties are found in all parts of the state. The species is characterized by its shining, glabrous, often somewhat glaucous stem, with no hairs below the inflorescence. The leaves, too, are often glaucescent, especially in var. *leiophylla*. The leaves are mostly broader than in typical forms of the other species of the *S. canadensis* group, but narrow-leaved forms may be found. The phyllaries are characteristically obtuse or rounded, with a well defined green tip. This species is much more distinct than the four following ones.

11a. *Solidago gigantea* Ait. var. *gigantea* (Ait.) Rosendahl & Cronquist, comb. nov.

*S. gigantea* Ait. Hort. Kew. Ed. 1. 3:211. 1789.

*S. serotina* Ait. var. *gigantea* A. Gray, Syn. Fl. 2(1):156. 1884.

Less common than var. *leiophylla*. The leaves are rougher and more evidently veiny than in var. *leiophylla*, and often narrower.

11b. *SOLIDAGO GIGANTEA* Ait. var. *LEIOPHYLLA* Fern. *Rhodora* 41:457. 1939.

*S. serotina* Ait. Hort. Kew. Ed. 1. 3:211. 1789.

12. *SOLIDAGO LEPIDA* Nutt. var. *FALLAX* Fern. *Rhodora* 17:9. 1915.

Found chiefly in the northern part of the state. Some specimens approach var. *elongata* (Nutt.) Fern. On the basis of local material only, *S. lepida* scarcely seems different enough from *S. canadensis* to warrant specific recognition. There are large areas in the west, however, where *S. lepida* is common and *S. canadensis* is rare or absent. There are, furthermore, several good varieties of *S. lepida*, based on shape of the inflorescence. Reduction of *S. lepida* to *S. canadensis* would necessitate the establishment of a hierarchy, and although monographic study might well show a procedure to be best, we are not willing to do so on the basis of our present knowledge.



13. *SOLIDAGO CANADENSIS* L. Sp. Pl. 878. 1753.

Found mostly in the northern part of the state, but occasional southward. This species is characterized by its very small heads and only slightly pubescent leaves. Most of the plants formerly referred here belong to one of the two following species, or to the preceding one. The phyllaries in this and its three close relatives are mostly slender and acute, without very prominent green tips, but there is considerable variation between individuals. The difference in imbrication of the involucre between *S. canadensis* and *S. lepida* var. *fallax* is difficult to express adequately, and is best seen by comparison of specimens.

14. *SOLIDAGO ALTISSIMA* L. Sp. Pl. 878. 1753.

?*S. canadensis* L. var. *Hageri* Fern. Rhodora 17:11. 1915.

Abundant in the southern part of the state, but mostly giving way to *S. pruinosa* toward the northwest. Both of these species seem to be absent from the northeast.

Most of the local "*S. canadensis*" as treated in past years is this species or *S. pruinosa*. The usually subentire leaves of *S. altissima* are thicker and firmer than the sharply serrate leaves of *S. canadensis*, but these characters are not dependable. The difference in pubescence, as noted in the key, seems to be fairly constant.

The smaller-headed forms of this species have commonly been segregated as a separate variety or species, or subordinated to *S. canadensis*. The difference in head size is not very great, and in our area seems not to be correlated with other characters. Any separation must be entirely arbitrary, and would be of doubtful value. Whether the small-headed forms of Minnesota are taxonomically identical with the more eastern small-headed plant that has been named *S. canadensis* var. *Hageri* is questionable.

15. *SOLIDAGO PRUINOSA* Greene, Pitt. 4: 70. 1899.

*S. canadensis* var. *gilvocanescens* Rydb. Contr. U. S. Nat. Herb. 3:162. 1895.

*S. gilvocanescens* Smyth, Trans. Kans. Acad. Sci. 16:61. 1899. Nomen nudum.

Range in the state about the same as *S. altissima*, but less common in the south.

We are indebted to Dr. L. H. Shinnars for pointing out the differences between *S. pruinosa* and *S. altissima*. Minnesota is about at the eastern edge of the range of *S. pruinosa*, and the western edge of the range of *S. altissima*. The difference between the two is not always very sharply marked, and it may eventually be shown that they are only subspecifically distinct.

16. *SOLIDAGO RIGIDA* L. Sp. Pl. 880. 1753.

*Oligoneuron rigidum* Small, Fl. S.E. U.S. 1188. 1903.

Characteristically in dry, often sandy places; common in the prairie area, but extending well into the coniferous forest area, as indicated by specimens from Clearwater, Itasca, and St. Louis Counties.

17. *SOLIDAGO RIDDELLII* Frank in Riddell, Syn. Fl. W. U.S. 57. 1835.

*Oligoneuron Riddellii* Rydb. Fl. Prairies & Plains 799. 1932.

Wet meadows and bogs; local; stations known in Hennepin, Dakota, Scott, Chippewa, and Clay Counties.

18. *SOLIDAGO GRAMINIFOLIA* (L.) Salisb. Prodr. 199. 1796.

- 18a. *Solidago graminifolia* (L.) Salisb. var. *typica* Rosendahl & Cronquist, nom. nov.

*Chrysocoma graminifolia* L. Sp. Pl. 841. 1753.

*Euthamia graminifolia* Nutt. Gen. Am. 2:162. 1818.

Various habitats, particularly lake shores, meadows, and sandy places; throughout the state but infrequent in the southeast.

- 18b. *SOLIDAGO GRAMINIFOLIA* (L.) Salisb. var. *MAJOR* (Michx.) Fern. Rhodora 46: 330. 1944.

*Euthamia camporum* var. *tricostata* Lunell, Am. Midl. Nat. 2:59. 1911.

*Solidago graminifolia* var. *septentrionalis* Fern. Rhodora 17:12. 1915.

*S. graminifolia* var. *tricostata* S. K. Harris, Rhodora 45:413. 1943.

*S. lanceolata* L. a. *major* Michx. Flor. Bor. Am. 2:116. 1803.

Occasional in the northern part of the state; known from St. Louis and Lake of the Woods Counties; a few other northern collections approach this variety.

Some of our plants of this species approach var. *Nuttallii* (Greene) Fern., but typical plants of that variety do not seem to occur in Minnesota.

- 19 *SOLIDAGO GYMNOSPERMOIDES* (Greene) Fern. Rhodora 10: 93. 1908.

*Euthamia gymnospermoides* Greene, Pitt. 5:75. 1902.

Various habitats, particularly in sandy soil; across the southern part of the state, as far north as Anoka and Lac Qui Parle Counties.

Where the range of *S. graminifolia* overlaps that of *S. gymnospermoides* as it does in southern Minnesota, the two species intergrade to some extent and no one of the key characters is entirely dependable for their separation. Even the character of narrower heads in *S. gymnospermoides*, which is an expression of the reduction in number of florets, does not hold consistently where the two species occur together. Except for the occasional intergrades which are encountered the difference in the nervation of the leaves is sufficiently reliable for distinguishing the species. The character, however, is difficult to define in a few key statements and it requires a certain degree of familiarity with the plants before one learns to interpret and apply it properly.

## Book Reviews

EDUCATION IN CONSERVATION OF OUR NATURAL RESOURCES. Special Education Program of the 22nd Annual Meeting of the Izaak Walton League of America (Hotel La Salle, Chicago 2, Ill.) 1944. 31 pages, 10 cents.

The Committee on Education in Conservation, originally sponsored by the National Wildlife Federation, was an outgrowth of a realization of the fact that any broad program of conservation can never attain intelligent and effective support until a grounding in conservation becomes a part of the school program. The twenty-second annual meeting of the Izaak Walton League devoted one session to a program of papers by four persons qualified to speak on the various phases of the problems involved.

Dr. Henry B. Ward traced the history of the movement for education in conservation. He emphasized the gradual growth of awareness of the needs for conservation and the part that spectacular disappearances and extermination of wild species played in the awakening of general interest in conservation. At first, direct efforts toward remedying impending individual catastrophes were the chief objectives of those interested. Only with the present century did this interest expand toward the beginning of a realization that basic principles are involved. He traced the history of the founding and objectives of the Izaak Walton League and of the National Wildlife Federation. With emphasis he referred to the superiority of education over the attempts at "conversion" to the needs for conservation. He called attention to the continuation of the operation of the Committee on Conservation Education even though the program of its sponsoring Federation had been interrupted. Materials intended for actual use in schoolroom teaching have been prepared by this committee. One of these publications was reviewed in this journal (vol. 27, page 270). Dr. Ward's especial plea is for the effective use of this and other available materials and for the reform or readjustment of the school program that might make this use possible.

Dean Thomas Eliot Benner gave the reactions of a leader in the educational program of our country. According to his views, the school programs are already overburdened with desirable and demanded material. "Conservation will get into the schools—not through the introduction of new subjects, because new subjects are going to have the greatest difficulty in fighting their way into the school program—but through inclusion in subjects already in the schools." History, geography, arithmetic, reading, social studies, and the sciences can all be modified so as to include materials which bear on conservation, but we have not yet done this very successfully. The support of educational leaders rather than of administrative agencies must be sought. The war emergency has seen the successful utilization of similar means for the introduction of aeronautics into the schools. Not pressure but appeal to common sense seems to be the avenue best suited for introduction of new materials in the schools.

Dr. Frank E. Baker spoke from the viewpoint of educational leadership. He stressed love of soil and conservation of health as the two fundamental fields which need emphasis in the education of teachers. Both of these offer opportunity for training in conservation.

Mr. Tom Wallace spoke "From the Desk of Men Who Watch National Currents" and by examples showed how the public press has been too little cultivated in the attempts at gaining sound support of the public for conservation in all of its aspects.

Upon reading this report the reviewer is impressed with the fact that conservation education is not a simple matter for easy attainment. The collation of materials on conservation is futile unless that material can be brought to the attention and intelligent appreciation of the public. The insinuation of such material into the curriculum has little hope of achievement from frontal attack. During their professional training teachers may be indoctrinated with the importance of conservation in all human affairs. Cooperation between conservation organizations and educational leaders seems to offer

the most fruitful promise for introduction of conservation education into the schools. On the other side of the educational program, for adult education the press offers opportunities for moulding public opinion which have been inadequately cultivated in the past.

—HARLEY J. VAN CLEAVE

THE FISHES OF MANITOBA. By David Hinks. The Department of Mines and Natural Resources, Province of Manitoba, Winnipeg, Man. x+102 pp., 94 illus., 5 maps. Paper, \$0.60; cloth, \$1.00.

This small book is another of the several semi-popular studies of regional ichthyofauna of this country which have appeared during the past decade. Planned to be of value to fisherman and student alike, the booklet is eminently successful. Early chapters cover briefly the biology of fishes, their classification, and techniques for their identification. Included are keys to the families and to species. Subspecies considerations and use of trinomials are in general avoided, but the nomenclature is modern as far as it is carried.

Original illustrations are few other than seventeen line drawings used to illustrate anatomical features and key characters. Two figures inadvertently claimed as new are obviously copied from color plates in Forbes and Richardson (1920. The Fishes of Illinois. Natural History Survey of Illinois, Vol. 3). One of these is for the carp, *Cyprinus carpio* (p. 46). The other is for the greater redbreast, *Moxostoma rubreque* (p. 41), the original figure of which is now identified as *M. aureolum*, the northern redbreast. The text may be said to be rather completely and satisfactorily illustrated.

There is a minor mistake in the subfamily ending for the darters (p. 71) and in the retention of the subspecific name *zebra* for the northern logperch *Percina caprodes semifasciata*.

The species coverage is apparently complete for the area. For most forms there is given a good summary of range and habitat data, value, and natural history information where known.

Finally there is a short discussion of factors determining present distribution and abundance. A well-chosen set of critical terms is defined in the glossary and a list of reference literature is given.

The publication is a real contribution to ichthyology and is no small monument to the scholarly ability of the late author, a casualty in the European theater of this War.—KARL F. LAGLER, University of Michigan.

THE PERMEABILITY OF NATURAL MEMBRANES. By Hugh Davson and James Frederic Danielli. (With a Foreword by E. Newton Harvey). Cambridge University Press, Cambridge, 1943. x + 361 pp., 73 figs. \$4.75.

THE PERMEABILITY OF LIVING CELLS. By S. C. Brooks and Matilda Moldenhauer Brooks. Vol. 19 of *Protoplasma-Monographien*. Borntraeger, Berlin-Zehlendorf, 1941. Lithoprinted by Edwards Brothers, Inc., Ann Arbor, Michigan, 1944. xviii + 395 pp., 18 figs. \$5.00.

With the increasing complexity of biological science, it is extremely difficult for anyone to keep informed on recent developments in various branches of the huge science of living organisms and living processes. Our textbooks of elementary biology make a brave effort to keep abreast of modern cytology and genetics, and these books include discussions of mitochondria, salivary chromosomes, linkage, etc. However, in the field of cellular physiology, the elementary books are lamentably deficient. Cell physiology is not an easy subject for the average biologist to understand, and the literature in the field is so vast and so scattered that it is scarcely possible for anyone except the specialist to follow it. Fortunately, in recent years, there have been occasional monographs published, and these books are a great help both to the specialist and to the general reader.

One of the most successful branches of cell physiology is concerned with the permeability of the cell. Permeability studies, many of them based on newer and more accurate techniques than those formerly employed, have added greatly to our understanding of the relation of the cell to the surrounding medium. This is knowledge that no well-informed biologist can well ignore. Fortunately, two books on the subject have

recently become available. Davson and Danielli's monograph was published in 1943, although apparently it was written some years earlier. (The preface is dated 1940.) The monograph written by Brooks and Brooks was published in Berlin in 1941, as volume 19 of a series of Protoplasm Monographs.

Unfortunately, the Brooks and Brooks monograph has until recently not been available to readers in America; it was lithoprinted by the Edwards Brothers in Ann Arbor late in 1944. Both monographs are the work of capable and experienced physiologists, and they are to be recommended to biologists who wish to become acquainted with the literature on permeability.—L. V. HEILBRUNN, University of Pennsylvania.

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INTRODUCTION TO PARASITOLOGY. By Asa C. Chandler, John Wiley & Sons, Inc., New York. Seventh Edition, 1944. x + 716 pp., 309 figs. \$5.00.

This volume, in the opinion of the reviewer, is the best single American textbook devoted to parasites of man and related animals. It includes information on diseases caused by spirochaetes, protozoa, filterable viruses, trematodes, nematodes, and arthropods. The major portion of the publication deals with parasites in a general sense, whereas the latter part is devoted to the morphology and taxonomy of the arthropods together with the role they play in transmission of diseases. This treatise though comprehensive, is by no means perfect. In various instances the organization definitely could be improved and much repetition eliminated. As an example of inconsistency, the author states under the Babesiidae (p. 209) "Two genera, *Babesia* (formerly *Piroplasma*) and *Theileria* cause important diseases in domestic animals, characterized by destruction of red blood corpuscles and elimination of hemoglobin with the urine," whereas about midway page 210 he states "They (the *Theileriae*) do not cause anemia, jaundice, and hemoglobinuria as do the *Babesia*, but they do cause fever." Another instance of shortcoming is exemplified in the chapter dealing with a general discussion of the flukes. The information imparted here applies almost wholly to the digenetic species, which is permissible but should be so stated. The statement, in regard to the Subclass Monogenea (p. 259), that these forms are provided "with powerfully developed posterior suckers and usually anchoring hooks" is not wholly true since none of the Dactylogyridae or Gyrodactylidae among others, possess posterior suckers. Inclusion of charts and tables summarizing pertinent information on the different groups of parasites would constitute an important addition.—J. D. MIZELLE.

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LABORATORY MANUAL FOR INTRODUCTORY STUDENTS. By C. Courson Zelif. Keeler's Book Store. State College, Pa. 1944. 144 pp., 2 plates+15 figs. \$1.50.

As a general rule instructors in General Zoology prefer to organize the accompanying laboratory procedure in an individual manner as shown, in part, by the appearance of additional manuals to cover this phase of the subject. Zelif's manual is designed for a two-semester zoology course and in many instances offers a wide variety of forms to choose from provided all the material cannot be covered for one or more reasons. The acceptance of Pearse's attempt toward a stabilization of nomenclature together with the selection of exercises and clarity in presentation is admirable. However, if one were searching for shortcomings of the publication it might be suggested that in order to make the directions conform more with his own ideas which may or may not be justified, he might ask for 1) an exercise on cell division (inclusive of amitosis) rather than one dealing solely with mitosis, 2) equal use of illustrations for all major phyla, 3) deletion of protochordate, cyclostome, dogfish exercises which probably are a response to ephemeral (we hope) military requirements, and 4) inclusion of exercises on reproduction, genetics, possibly paleontology (evolution), and taxonomy. The insertion of an exercise on embryology between the Protozoa and histology plus the inclusion of an exercise on a mammalian brain with nothing else on this class of chordates seems a bit irregular but as indicated above this may be an expression of individualistic presentation of the laboratory work and not a serious criticism. Dr. Zelif is to be congratulated on the production of a manual which will serve as a stabilizing force for beginning students who so often flounder in the rough seas of academic pursuits.—J. D. MIZELLE.

